

UGANDA PROTECTORATE

Annual Report

OF THE

DEPARTMENT OF AGRICULTURE

FOR

THE YEAR ENDED 31st MARCH, 1914

Published by Command of His Excellency the Governor



KAMPALA :

PRINTED BY THE UGANDA PRINTING AND PUBLISHING COMPANY, LTD.,

1914.

UGANDA PROTECTORATE

DEPARTMENT OF AGRICULTURE

ANNUAL REPORT, 1913-14

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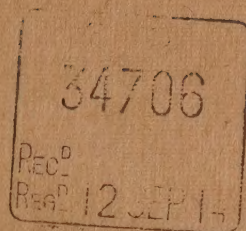
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" "	Kadunguru Plantation
" "	Government Plantation, Kampala
" "	" " Kakumiro
" "	Chief Veterinary Officer
" "	Government Entomologist
" "	" Botanist

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Staff List

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R. G. HARPER

T. D. MAITLAND

Assistant District Agricultural Officer : J. D. SNOWDEN

Stock Farm Manager : J. S. HARMSWORTH

Ploughing Instructor : G. W. MCNEIL

Biological Division

Entomologist : C. C. GOWDEY, B. Sc., F.E.S., F.Z.S

Botanist : WM. SMALL, M.A., B. Sc.

Veterinary Division

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Stock Inspectors :

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Clerks:

A. S. WIDGERY

J. A. M. D., SA

J. X. D' MELLO

ANNUAL REPORT

OF

THE DEPARTMENT OF AGRICULTURE

For the Year ended 31st March, 1914

DEPARTMENT OF AGRICULTURE,

Kampala, Uganda,

May, 1914

COTTON

The remarkable progress in the extension of cotton cultivation has been maintained, particularly in the Eastern Province. The acreage devoted to cotton in the Protectorate was considerably above 100,000 acres. It is not easy to form accurate estimates of acreage in Buganda Kingdom, but the quantity grown was probably in the neighbourhood of 25,000 acres. In the Eastern Province the advance has been most remarkable, as the following table showing the acreage for the last three years in each of the four districts will testify :—

Acres in Cotton

District	1911-12	1912-13	1913-14
Teso	12,000	19,000	33,738
Busoga	10,000	15,000	25,000
Bukedi	6,720	4,230	20,104
Lango	1,000	1,200	4,872
Total	29,720	39,430	83,714

It will be noted that in the case of the Bukedi district there was a considerable falling off in the second season tabulated. This was due to the low prices obtained for the 1911-12 crop ; the transport difficulties were very great and few of the ginners sent their representatives into the district ; the result was that the crop was bought at low prices by middlemen and the natives grew dissatisfied and planted less cotton in the ensuing year. The smaller 1912-13 crop found a ready market, with the result that the growers more than quadrupled their acreage during the past season.

The Size of the Crop

The Returns of the Customs Department for the financial year ending March 31st, 1914, show an increase in cotton exports of about 1,800 bales over the preceding year. This does not, however, represent the actual increase, as though the Eastern Province crop had practically all been sold at the end of the financial year only a small proportion had been ginned and exported.

The actual out-put of the Eastern Province for the past season has been 17,992 tons of seed cotton ; the Teso district heads the list with a crop of 8,836 tons.

It is impossible to give detailed figures showing the crop for Buganda Kingdom, but the total quantity of cotton sold during the year amounted to approximately 6,000 tons.

The following Table shows the acreage and out-put of each cotton growing district in the Protectorate ; in the case of the Eastern Province, the figures may be taken as approximately correct, but in the case of the other districts, a large margin of error must be allowed :—

Estimated Cotton Crop, 1913-14

Province and District	A cres	Tons seed cotton
BUGANDA PROVINCE :-		
Mengo	20,000	
Masaka	2,000	6,000
Mubendi	3,500	
EASTERN PROVINCE :-		
Teso	33,738	8,836
Busoga	20,104	3,600
Bukedi	25,000	4,000
Lango	4,872	1,456
NORTHERN PROVINCE :-		
Bunyoro	700	175
Gulu	100	20
WESTERN PROVINCE :-		
Toro	150	20
Ankole	100	15
Total		24,122

The Quality of the Crop.

The quality of the Eastern Province crop has been the subject of some comments. The ginnerers report that the lint-percentages obtained have been disappointing, and some of the cotton was inclined to be weak.

Though this has been the cause of some slight anxiety, I consider it to have been purely a seasonable variation. The latter rains were a little late in the Eastern Province, and the effect of this on the crop was very marked. At the beginning of September when the rains were due, the crop was looking well, but, as the rains failed to commence, its condition began to fall off; fortunately, good rains in October saved us from a partial failure of the crop, but the check to development affected the cotton to some extent.

Ginneries

The ginning capacity of the ginneries was not sufficient to cope with the crop. This is, however, rapidly being rectified, and there are now no less than nineteen power ginneries built and building in the Protectorate.

The new ginneries are being erected at central points in the cotton districts, six of them being in Teso district. There are, however, several important areas which are still neglected, the most important being the Bukedi district, to the future welfare of which a ginnery is essential.

There are in Buganda Kingdom a number of hand-power ginneries. Established hand-ginneries have been given every facility to carry on their business, but additions to their numbers have not been encouraged. In the Eastern Province they have been excluded altogether.

Legislation Affecting Cotton

During the past year some further Rules under the Uganda Cotton Ordinance came into force. These Rules provide for the continued Government control of the seed supply, and other matters included in 1909 Rules which are now repealed. They further provide for the introduction of the market system and for the licensing of cotton buyers.

Cotton Markets

The system of cotton markets inaugurated in the Eastern Province has been eminently successful. In the Teso and Lango districts, cotton has been brought into central points for sale since the introduction of the crop, but during the past season, a definite scheme of markets was introduced throughout the Province.

Cotton Licences

Every cotton-buyer must hold a Licence to purchase cotton, or a Permit granted by the holder of a Licence.

259 Licences to purchase cotton were issued and 2,623 Permits under these Licences were taken out.

Of these Permits, no less than 2,103 were taken out in Buganda Kingdom, where the market system is not in force. In the Teso district, with a crop greater than that in the whole of Buganda Kingdom, the number of Permits issued was only 96.

The Future

The possibilities of future extension are bound up in the question of Transport. The moving of the present crop is a serious burden. The Eastern Province crop alone represents upwards of half a million porters' loads and the greater portion of this has been carried considerable distances by human transport. The great call for porters comes at a time when the natives should be preparing the land for their principal food-crop. The cotton industry cannot be allowed to endanger the food supply, and under the present conditions of transport, any considerable increase over the present acreage would do so. If human portage can be done away with, a very large extension in cultivation may be looked for.

Uganda Cotton

Uganda Cotton is the progeny of some American Upland seed imported in 1910. A number of varieties were imported and were tried during the 1910-11 season on plots in different parts of the Protectorate.

After these trials, two, out of considerable number of varieties, were retained and the rest were discarded. The two varieties were "Allen's Long Staple" and "Sunflower"; of the latter there were two strains, the one was imported direct from America, while the other had been propagated in British East Africa during a previous year. These three cottons were propagated and the old Uganda staple, which had been the subject of many complaints, was entirely discarded.

The British East Africa "Sunflower" was grown as the main crop for a season, and was then rejected.

During the past season the whole of the main crop was of the Allen stock.

Both the Allen and Sunflower varieties are being bred from selected plants at the Kadunguru Seed Farm.

During the 1914-15 season the main crop will again be of the Allen stock, but about 6,000 acres in a segregated area will be planted with a Kadunguru selection of the "Sunflower."

Administrative Officials.

No observations on the Uganda Cotton Industry can be complete without some remark on the work done by the Administrative Officials in the Eastern Province. The District Commissioners have fostered the Industry from its inception; they have, in conjunction with the Officers of this Department, distributed the seed to the natives and supervised the growing and harvesting of the crop. Their interest in the crop has been unflagging; and the Eastern Province cotton industry, which is Uganda's principal commercial asset, is in no small measure a monument to their energy and zeal.

EUROPEAN PLANTATIONS

There has been a further expansion in the Planting Industry. The acreage under cultivation is now in the neighbourhood of 20,000 acres.

Coffee maintains its position as the principal crop, but some anxiety is felt as to the eventual effects of the leaf disease.

Attention has been turned to other crops and Cocoa is now receiving the attention it deserves. Development has been quieter, but it has been steady and the outlook is encouraging.

THE PLANTING DISTRICTS

The Buganda Province is the focus of the Planting Industry, and the great majority of the Plantations are situated in the Kingdom.

A considerable area of land was taken up in Busoga, but enquiries for land in this district have declined.

A number of Plantations have been opened in Bunyoro, and attention has recently been drawn to the possibilities of Toro as a planting district.

EXPERIMENTAL PLANTATIONS

The three Government Experimental Plantations have been maintained. Two of these have been devoted to plantation crops, and the third, which is situated in the Teso district, is primarily a Cotton-Breeding Station.

COFFEE

The work on Coffee has consisted largely of experiments in spraying and a general study of the leaf disease (*Hemileia vastatrix*). There has been a considerable extension of planting.

COCOA

The Cocoa at the Government Plantation, Kampala, is now in bearing, and a study is being made of the varieties with a view to the separation of the more desirable types. Various types are being selected and a series of plots is being prepared on which each type will be grown on an individual plot.

RUBBER

There has been some increase in the area under Para. Other rubbers are neglected.

TOBACCO

Experiments with Tobacco have been confined to those at the Kadunguru Plantation, and the results of these will be found in the Plantation Report. A number of planters are taking an interest in the crop and have obtained seed to experiment on their own account. These experiments have demonstrated that Tobacco can be grown successfully; the introduction of a highly specialised crop of this description as a commercial proposition is, however, a matter of some difficulty.

TEA

The position as regards Tea is unchanged. The crop is still represented only by a few experimental plots. A report on a sample prepared at the Government Plantation is included among the appendices to this Report.

WHEAT

Efforts were made to raise interest in Wheat, with the view of getting a mill erected in Toro. At present the crop is dealt with by hand-machinery, which has been loaned to the Church Missionary Society by the Government.

Wheat was introduced into the foot-hills of Mount Elgon, but on account of the difficulties of transport the crop was unsaleable. The industry made no advance during the year.

SIM-SIM

A quantity of Sim-Sim was imported from Kavirondo last year, as we were informed by a commercial firm that the Kavirondo variety was superior to the local product as an oil-seed. This has been propagated on the Government Plantations and is now being introduced into the Lango district, where Sim-Sim is of considerable importance as an export crop. As complaints have been received regarding the deterioration of Lango Sim-Sim, the importation of new seed may prove to be of some importance.

PLOUGHING

The introduction of ploughing among the natives has been a matter of considerable difficulty, and in most districts all efforts in this direction have ended in total failure.

It is pleasant to report that in the Teso district ploughing and the use of oxen has at last obtained a permanent foot-hold. At present the use of ploughs is confined to the Chiefs, but among them it is now general and is spreading rapidly.

AGRICULTURAL INSTRUCTION

The Department employs eighty native instructors. The duties of these men consist in visiting all native villages, giving advice and reporting on the state of the crops. Many of these native instructors do invaluable work, and they have been a great factor in the development of the Cotton Industry.

VETERINARY

The Report of the Chief Veterinary Officer is included in this Report. An estimate of the number of Live Stock in the Protectorate will be found in the appendix.

BIOLOGICAL

The Reports of the Economic Entomologist and the Botanist are attached. The Botanist was appointed shortly before the commencement of the financial year under review ; his time has been employed largely in the study of the Coffee Leaf Disease, but he has also determined a large variety of fungoid diseases of minor importance, and has laid the foundations of an Herbarium.

TYRRELL BRUCE

Acting Director of Agriculture.

Report on the Government Plantation

Kadunguru, Bugondo

WEATHER

The following table shews the rainfall at Kadunguru month by month for the year from 1st April, 1913, to 31st March, 1914 :-

Month	Number of days on which rain fell	Amount of rain in inches
April	16	9.06
May	23	10.24
June	18	7.66
July	6	2.49
August	8	2.52
September	4	0.91
October	14	6.11
November	12	3.99
December	4	1.88
January	4	2.20
February	5	1.37
March	10	3.53
Total	124	51.96

The total rainfall was fairly good although the number of days on which rain fell was comparatively low. September was an abnormally dry month in the Teso and Lango districts, and the drought had a serious effect on the quality of the past year's cotton crop.

Hailstorms passed over parts of these districts, and Kadunguru was visited by one on 13th June, which did some damage to the Sim-Sim and early cotton crop.

CROP AREAS

The following are the areas of crops grown on the Plantation during the past year :—

Crops	Acres
Cotton	62
Tobacco	2½
Sim-Sim	4
Ground-nuts	3
Indian Gram	2
Maize	2½
Buckwheat	5
Rose cocus beans	½
Pigeon Pea	½
Mucana	1
Millet	2
Sweet potatoes	10
Total	95

COTTON SEED SELECTION AND PROPAGATION

The work of seed selection and propagation was continued with the two varieties of Long-Staple American Upland, Allen and Sunflower, on the system laid down in the previous year.

(a) SUNFLOWER :—An area of about 32 acres was sown with seed obtained from the best individual plots grown on the Plantation in season 1912-13. A sample of that cotton was forwarded to the Imperial Institute, and received the following report :—“This cotton is of excellent quality, except for a little irregularity in strength. Length of staple from 1.5 to 1.7 inch. Ginning percentage 28.4 per cent”.

The seed was sown in the months of May, June and July. The early sowings did not come up well, but the later sowings did better, and a good stand of plants was ultimately obtained.

The May sown cotton suffered from bollworm and other pests in the early stages of bud development, and a considerable shedding of squares took place. This attack disappeared in September, and, with the exception of the stainer, no further disease was observed on the crop during the season.

An examination of the cotton was made on the field, and it was seen that the cotton maintained the good properties for which it was selected last season. A few short staples were found, but in general, the staple was long, silky and strong, the average length being 1½ inch.

The total yield from the above crop was 18,165 lbs; equal to 567 lbs. per acre. The seed cotton was ginned by the Bukedi Cotton Trading Company at Bugondo, and the proportion of lint to seed was 29.5 per cent.

The seed from the above cotton will be sown in a restricted area in Serere County next season.

(b) ALLEN : The seed from the 52 plants selected from the Allen crop in the previous year were sown in separate plots last year. The crop was sown early in May and a good stand of plants was obtained. Early in June the crop was damaged by a hailstorm, and later in the season, the plants were attacked by leaf-eating insects and Aphis blight. The crop was also seriously affected by the drought in September, but it revived with the rains in October and November.

In consequence of the many and varied climatic changes during the growing season, the difficulties of selection work were very much increased, because with each change of weather, the character of the cotton also seemed to change, and a cotton which appeared to be satisfactory for propagation in October, was found to be the reverse in December.

Much time was spent in endeavouring to select the most suitable plots out of the 52 for propagation. Ultimately plots 3, 4, 13, 17, 25 and 51 were selected. These plots were carefully examined and rogued out, any plants showing any variation from the parent type being rejected. The plots were picked and bagged separately, and the seed cotton from each was ginned separately.

A report on each sample is given on Table No 1.

I regret to say that all of these selections showed a change in character towards the close of the season. In every case the fibre seemed to have become weaker, and there was every indication of depreciation in quality. Whether this is a permanent deterioration or only the result of the peculiar weather conditions of the past year will be proved next season.

The Sunflower cotton did not show the same deterioration in quality, and although there was a slight falling off towards the end of the season, the change was less appreciable and not nearly so general as in the case of the Allen cotton.

No individual selections were made among the Allen crops during the past season.

From the crop of improved Sunflower cotton 20 selections were made. The plants were selected carefully in the field and the cotton was examined in the house, with the result given in Table No 2.

These selections will be propagated on the Plantation next season, and good results are anticipated from some of them.

Particular attention is being given to the segregation of a cotton which will withstand the vagaries of the climate, a cotton with strong and uniform fibre, of good length and silkiness. The Sunflower variety appears to have acclimatised better than the Allen variety, and, by repeated selection from the individual year after year, it is expected that the former will ultimately produce a cotton having the desired properties.

TOBACCO

Experiments with Tobacco-growing were continued during the year under review. The varieties grown were pipe tobaccos—Kentucky, Lacks and Hestor; and Turkish tobacco—Kavalla

The seed was sown in a nursery on 20th April, and the plants were set out in the first 10 days of June. The weather was favourable throughout the growing period and there were no hailstorms. No disease of any kind was observed on the crop, nor mildew on the leaf, and the crop was a very successful one. The cutting of the tobacco began on 8th September and the leaf was hung up in a wattle and daub house to dry. Fine weather favoured the harvesting of the leaf, and the latter was got in good condition, there being a good formation of gum on the leaf. The leaf took about 45 days to cure, and it was then taken down and placed in a bulk. A slight fermentation took place and the bulk was broken down every two days until fermentation ceased. The opinion of a Tobacco Expert on the quality of the leaf has not yet been obtained, but it has now been proved by experiment that the crop can be grown with success in this district, and that it might be a remunerative crop for European planters to take up in the future.

SIM-SIM

A few acres of the Kavirondo seed were grown for introduction among the natives in the district. Part of the crop was spoiled by a hailstorm, but a trial plot of one acre yielded 480 lbs.

GROUND-NUTS

A few acres of the ordinary Ground-nuts were grown, and a trial plot of one acre grown on land after cotton yielded 600 lbs. of unshelled nuts.

MAIZE

Small areas of the two varieties, Hickory King and Yellow Hogan, were grown for introduction among the natives. Both of these were successful and heavy yields were reaped.

INDIAN GRAM AND BUCKWHEAT

Further experiments were carried out with these crops, and both were again successful. The Indian gram yielded at the rate of about 300 lbs. per acre, and the Buckwheat at about 500 lbs. per acre. Seed from these crops as well as the Maize is being distributed among the Chiefs in Teso district for propagation next season.

NATIVE COTTON INSTRUCTORS

In all 20 Native Instructors were employed in the Teso and Lango districts—13 in the former and 7 in the latter. Of these 9 were new men, who attended at Kadunguru for instruction in the work of cotton planting. All of the instructors visited Kadunguru from time to time to report. Their work was also examined on the spot at different times during the year and was found to be generally satisfactory.

The cotton crop in both districts was planted well and well cultivated during the growing period. In the Teso district the picking and handling of the cotton showed some improvement, but in the Lango district, the natives have still much to learn in that respect.

PLOUGHING INSTRUCTION

A Ploughing-School was opened at Soroti, and was well supported by the Chiefs in that County. A large number of boys and oxen were trained and broken in to the use of the plough. The number of ploughs in use in Teso district has increased considerably during the past year. All the ploughs in the district were inspected and found to be doing good work. It is gratifying to know that at last an European Firm has taken up the question of supplying the natives with ploughs and other implements, and that a depot for these will be established at Soroti in the near future.

R. G HARPER,
District Agricultural Officer.

**TABLE NO. 1.
REPORT ON THE EXAMINATION OF ALLEN COTTON FROM THE SELECTION EXPERIMENT PLOTS**

Number of Plant	Description of Plant, Habit, Height, &c.	Insect Pests	Diseases	Length of Staple	Strength	Regularity	Transmission	Percentage of lint		General Remarks
								1912-13	1913-14	
3	Recumbent, 5', long basal branches, short internodes, bolls long and pointed	Free	Free	1½	V. strong	Regular	Good	28	27.2	Suitable for propagation, lint long, silky of good strength.
4	Upright, 5', long basal branches, short internodes, bolls short and pointed	Slight stainer attack	Free	1 7/16	V. strong	F. regular	V. good	28	27.9	Suitable for further experiment, seed almost naked, free from fuzz, lint silky and strong.
13	Upright, 4', short basal branches, short internodes, bolls long and pointed	Free	Free	1½	Strong	Regular	Good	28.4	26.8	Suitable for propagation. Lint long, silky and strong.
17	Upright, 6½', long basal branches, short internodes, bolls large and pointed	Free	Free	1 9/16	V. strong	V. regular	V. good	29.4	29.1	Suitable for propagation. Regularity and strength very good.
25	Recumbent, 6', long basal branches, short internodes, bolls large and pointed	Free	Free	1 7/16	V. strong	Regular	Good	30.5	27.6	Suitable for propagation. Lint silky and strong, but staple is somewhat irregular.
51	Upright, 4½', short basal branches, short internodes, bolls large and pointed	Free	Free	1½	Strong	Regular	Good	28.5	27.6	Suitable for propagation. Regular lint, silky and strong.
6	Recumbent, 5', short basal branches, short internodes, bolls short and pointed	Free	Free	1 7/16	Strong	Regular	F. good	31.1	—	Suitable for propagation, a number of short staples rogued out.

REPORT ON EXAMINATION OF SUNFLOWER COTTON FROM INDIVIDUAL PLANT SELECTIONS

Number of Plant	Description of Plant, Habit, Height, &c.	Diseases	Resistance to pests	Number of bolls per plant	Weight of cotton per plant	Average length of staple	Percentage of lint	Regularity	Strength
1	Recumbent, 5', long basal branches, short internodes, large bolls	Free	Stainer	64	0.50	1½	28.5	V. regular	Strong
3	Upright, 4½', long basal branches, short internodes, large bolls	Free	Slight stainer	44	0.38	1 7/16	30	V. regular	Strong
4	Upright, 4', short basal branches, short internodes, large bolls	Free	Slight stainer	28	0.24	1½	30.8	V. regular	Strong
5	Upright, 5', short basal branches, short internodes, large bolls	Free	Stainer	33	0.25	1⅝	33.7	F. regular	V. strong
7	Upright, 5', long basal branches, short internodes, large bolls	Free	Slight stainer	43	0.36	1½	29	V. regular	Strong
10	Upright, 5', long basal branches, short internodes, large bolls	Free	Slight stainer	36	0.34	1 7/16	29.2	V. regular	Strong
12	Recumbent 4½', long basal branches, short internodes, large bolls	Free	Slight stainer	30	0.31	1 7/16	25	V. regular	V. strong
13	Recumbent 5', short basal branches, short internodes, large bolls	Free	Slight stainer	29	0.34	1½	29.2	V. regular	V. strong
14	Recumbent, 4', long basal branches, short internodes, large bolls	Free	Stainer	54	0.48	1½	27	V. regular	Strong
15	Upright, 4½', long basal branches, short internodes, large bolls	Free	Slight stainer	36	0.40	1 7/16	27	V. regular	V. strong
18	Upright, 5½', short basal branches, short internodes, large bolls	Free	Free	40	0.40	1½	31.2	Regular	V. strong
20	Recumbent, 5', long basal branches, short internodes, large bolls	Free	Stainer	64	0.45	1½	27	V. regular	V. strong

Report on the Government, Plantation, Kampala. 1913-14.

METEOROLOGICAL RECORDS.

The rainfall for the year may be said to have been unsatisfactory, for it was much below that recorded for the last five years, and although rain fell on 173 days, the distribution was unequal, for the months of June, July and August were a long protracted drought, broken only by rainfall which at times was hardly appreciable.

The following are comparative records :—

Months	1910-11		1911-12		1912-13		1913-14	
	No of days	Inches	No of days	Inches	No of days	Inches	No of days	Inches
April	18	8.75	15	5.84	27	5.73	24	10.16
May	16	7.72	18	4.85	24	4.54	20	5.06
June	7	2.49	9	3.82	20	3.00	13	2.17
July	11	3.25	3	.20	15	2.65	11	2.61
August	7	7.71	21	5.60	18	10.39	7	.83
Septemer	15	8.28	19	2.84	13	1.96	8	3.50
October	11	3.00	14	.79	21	6.21	20	1.78
November	15	8.25	24	8.60	23	3.07	20	3.80
December	15	4.57	10	.57	21	5.13	12	2.95
January	8	1.13	11	3.12	8	2.37	9	3.63
February	4	.77	12	2.57	15	3.96	9	1.63
March	16	6.65	26	8.39	15	7.68	20	3.81
Totals	143	60.57	182	47.19	220	56.69	173	41.93

MONTHLY AVERAGE TEMPERATURES

Months	At 7 a. m.		At 2 p.m.		Max. Tempt.	Min. Tempt.	Highest Maximum recorded	Lowest Minimum recorded
	Dry Bulb	Wet Bulb	Dry Bulb	Wet Bulb				
April	66.86	65.23	79.60	74.96	82.38	64.16	87	61
May	66.32	64.52	79.30	74.90	82.87	63.20	86	54
June	66.20	64.76	79.23	74.30	82.86	62.73	86	57
July	63.93	62.58	78.87	73.56	82.22	60.45	86	56
August	65.22	63.67	77.09	73.09	82.80	61.22	86	58
September	65.63	63.70	82.46	74.46	84.56	61.70	89	59
October	66.22	64.16	77.48	70.00	83.42	62.51	87	59
November	66.50	64.30	79.40	73.26	81.56	62.36	84	60
December	67.10	64.22	79.26	71.90	81.70	62.55	86	60
January	69.22	66.19	83.19	75.32	84.97	64.06	91	59
February	67.32	65.50	62.68	75.68	84.25	64.00	88	61
March	68.20	66.52	79.55	73.83	82.26	64.45	88	61

LABOUR

The labour has constituted a difficulty throughout the year as the supply has been inadequate to allow for much progressive work.

NURSERY

The Nursery has been reorganised and considerably extended and the stock of plants, both economic and decorative, largely increased. Considerable demand has been made for these plants with the resultant distribution :—

Economic		Decorative	
Cacao plants	5,306	Various plants	1,772
Coffee „	2,270		
Various „	3,570		
Total	11,146	Total	1,772

COFFEA ARABICA

The coffee crop has demanded more attention during the year than any other crop in the Plantation. The advent of the coffee leaf disease (*Hemileia vastatrix*) aroused much anxiety as to its future, and rightly so, for the whole of the older coffee was so badly affected, directly and indirectly, that it was found advisable to uproot it.

SPRAYING

The uprooting of the older coffee allowed for the concentration of remedial measures on the younger plots. These were sprayed systematically with Bordeaux and Burgundy mixtures, as soon as the drought ceased, during which time (the time of the drought) the disease had somewhat abated. The growing season had now set in.

At present the trees are almost free from the disease. This is remarkable, for a year ago they were simply overwhelmed. It is hardly justifiable to attribute its absence entirely to spraying, as a "control" plot is enjoying as much freedom from the disease as the others. It may be argued, however, that this freedom from the disease is the result of the spraying of the other plots, as the possibility of infection from spores was thus reduced.

OBSERVATIONS ON THE DISEASE

Had the months of June, July and August not been so dry, the leaf disease might not have been so much in evidence—or, rather, the extent of its ravages might not have been so great—for then the trees were doubly handicapped. Throughout this time several patches of the trees, growing in the alluvial parts, where there is a concentration of moisture and food-stuffs in the soil, were in quite a vigorous state of health, the leaf disease present being practically *nil*, so that while the conditions of the soil were admirable for the trees, the atmospheric conditions did not *then* favour spore germination.

Other instances were noted where one tree had a good crop of foliage, while its neighbour was entirely defoliated. This is to be accounted for by the fact that the healthy one had been defoliated and been able to renew its leaf system before the drought set in, whilst its neighbour, having withstood the disease longer, had to submit to defoliation during the drought.

DIE-BACK

The die-back, apparently a secondary condition of the tree, in all probability due to the devitalising effect of the leaf disease, was even more serious than the leaf disease itself. Many of the trees were unable to ripen their berries and eventually the branches began to die back from the tips. Cutting well beyond the live part of the branch was not effective in arresting the disease and it was at once seen that this procedure was futile.

MANURIAL TREATMENT

One plot was taken in hand. The yellow immature berries were picked off, the branches well pruned, and the plot manured with Kainit, 400 lbs being allowed per acre. This was dug in, and after a shower of rain the trees at once began to recuperate. Later, a slight dressing of cow manure was given with the result that the die-back was arrested and the trees are now in a luxuriant condition, so that this disease, to whatever cause it may be due, has submitted to this treatment, proving that it was constitutional rather than due to an external agency.

CONSEQUENCES OF THE DISEASE

Although the presence of the leaf disease and die-back is not now so apparent, we are now suffering from its indirect effects, for the trees which would have been bearing in the ordinary course of events, are now occupied in producing wood, which should have been done during the time of the ravages of the disease.

NEW VARIETIES AND SPECIES

With a view to establishing comparisons with our Nyasaland and Bourbon varieties, and to test immunity from disease, suitability of climate, yields, &c., several varieties and species have been introduced, and provisions made for laying out model plots. These include *Coffea arabica*, *Costa Rica* var., *C. stenophylla*, *C. libérica* and *C. robusta*, vars.

CACAO

The year under review has seen an increased interest in the Cacao crop. The demand by planters for Cacao pods has far exceeded the supply, and had transport facilities not presented a difficulty, the supply of plants would also have been insufficient to meet the demand.

The present year has seen the first cropping of the Cacao in the Plantation, which is now $4\frac{1}{2}$ years old ; fruiting commenced in the beginning of the year. This afforded the opportunity of observing the special qualifications of the several varieties. The prolificacy, the early fruiting qualities, and the vigorous growth of some are in striking contrast to others.

RECORD OF YIELDS

A number of trees (87 in all) have been under observation for the last 10 months, and a record of pods kept as tabulated below. The fruits of a few of these trees have, however, not ripened as yet. The varieties are so numerous that some difficulty is experienced in classifying them. These three divisions, however, embrace not only the types but also those varieties with a certain claim to the class :—

Theobroma Cacao Forastero				Theobroma Cacao Calabacillo			
Red Varieties		Yellow Varieties		Red Varieties		Yellow Varieties	
No. of tree	No. of pods	No. of tree	No. of pods	No. of tree	No. of pods	No. of tree	No. of pods
6	27	1	12	2	34	46	12
10	8	3	28				
16	8	9	19	4	21	57	2
17	19	11	8				
20	13	12	4	5	32	59	30
21	11	13	8				
22	11	14	8	8	2	69	1
24	9	18	2				
26	6	19	4	15	18	77	1
27	4	23	3				
29	11	25	9	87	43	78	7
31	9	28	4				
32	2	30	9				
33	3	39	1				
34	7	42	2				
35	8	43	2				
36	11	45	8				
37	4	47	4				
38	7	49	6				
40	1	50	4				
41	11	51	1				
44	2	52	11				
48	7	53	14				
55	1	54	3				
56	4	58	6				
60	4	61	4				
62	2	67	11				
65	4	68	10				
71	5	70	6				
72	8	76	16				
74	15	79	3				
75	24	82	46				
80	12						
81	14						
Total	34	292	32	6	150	6	53
Average	1	8.6	1	1	25	1	8.8

MODEL PLOTS

In order to isolate several of the bold types, a number of plots have been arranged for the reception of these, intercepted by the new species and varieties of *Coffea* already referred to.

SHADING versus NON-SHADING

The damage done during the year to the more or less exposed trees, by several severe hail, wind, and rain storms, is sufficient to justify the necessity of establishing an overhead shade, apart from doing so in order to create a natural condition for the tree. The trees are thriving best in the alluvial parts, where the luxuriant growth of the bananas interplanted is providing ample shade and protection.

PARÀ RUBBER

The uprooting of the coffee, to which reference has already been made, has been the means of enhancing the growth of the Parà interplanted. The cultivation here had become rather intense, and some means of replenishing the soil had to be resorted to. Dhal (*Cajanus indicus*, Spreng.) was sown fairly thickly over the whole area, and made such rapid growth that, in less than four months, an ample supply of mulch was obtained. Two half-acre plots of the mulch were cut down to four inches and weighed separately, yielding respectively :— 1,602 lbs and 1,606 lbs—total 3,208 lbs of green mulch per acre.

In addition to this benefit, the mulch has been the means of saving considerable labour in weeding and also of preventing wash.

The following table shews record of growth from date of planting:—

Date when planted	1st Measurement, March, 1912	2nd Measurement, Sept, 1912	Average Increase	3rd Measurement, Aug., 1913.	Average Increase	4th Measurement, Jan., 1914.	Average Increase
	Average Girth	Average Girth		Average Girth		Average Girth	
May, 1910	3½ inches	5½ inches	1½ inches	7¾ inches	2¾ inches	8 5/8 inches	1½ inches

TEA

Much interest has been aroused in this crop and many enquiries have been made during the year by planters as to its possibilities.

With a view to deciding the quality and commercial value of the tea grown here, an ungraded sample was prepared and submitted to the Imperial Institute for report.

Of the two plots of tea growing on the Plantation, the lower one hard by the drained swamp, is the most prolific, whilst that on the higher level has a stunted growth and makes little or no progress.

BANANA FLOUR

The following is the result of the preparation of "Gonja" Banana flour. The cost of the production of the material is neglected as it is planted in order to provide shade for the Cacao :—

Number of Bunches	Weight of bunches entire	Weight of edible matter	Weight when dry	Loss in drying	Weight of Flour
6	105½ lbs	49½ lbs	23 lbs	26½ lbs	23 lbs

GENERAL

This report is confined to the crops of general interest, and nothing has been said of the labour involved in the cultivation of incidental crops and the production of foodstuff which has taken up much time and labour throughout the year.

T. D. MAITLAND

District Agricultural Officer

Report on the Government Plantation Kakumiro

AREA

The total area under cultivation is 32.34 acres, divided up as follows :—

Crops	Acres
Coffee	23.36
Para	4.44
Funtumia	.12
Ceara	1.75
Cocoa	.42
Bridelia	.50
Nurseries	.25
Miscellaneous	1.50
Total	32.34

RAINFALL

The past year was remarkable for the very dry weather experienced during the months of December, January and February. This drought has had its effects on the crops, particularly the coffee and annual crops. Figures of the rainfall, as far as possible, are given in the following table:—

RAINFALL

Months	1912-13	1913-14
	Inches of rain	Inches of rain
April	No record	7.16
May		2.12
June		No record
July		1.29
August		248.
September		4.37
October	3.01	6.49
November	6.06	3.13
December	1.10	0.14
January	1.17	2.05
February	2.85	0.77
March	3.91	6.09
Total	18.10	36.09

COFFEE

This is the chief crop grown, and the trees vary in age from ten years old to those planted out this year.

The older trees were much neglected in the past before the Plantation was taken over by this Department in May, 1912, and this must be taken into consideration in relation to the small number of trees per acre, as many trees died during that period.

The gaps have, in many cases, been filled up, but these trees are of necessity many years behind the older ones.

Particulars of the season's crop are to be found in the subjoined table, together with those of last year, for the purpose of comparison :—

YIELDS FOR SEASON 1912-13

Year planted	Area	Total No. of trees	Average No. of trees per acre	Distance apart	Total yield in lbs.	Average yield per acre in lbs.	Average yield per tree in lbs.
1904	5.23	5,750	525	8'x 8'	5,506	1,052	2
1906	2.11	1,220	578	do.	2,320	1,099	1.89
1907	1.90	926	487	do.	1,446	761	1.56
1910	1.95	1,332	683	{ do. triang.	926	474	.69

YIELDS FOR SEASON 1913-14

1904	5.23	2,859	546	8'x 8'	5,410	1,034	1.89
1906	2.11	1,324	627	do.	1,020	483	.77
1907	1.90	1,187	630	do.	2,422	1,274	2.04
1910	1.95	1,511	774	{ do. triang.	3,340	1,712	2.21
1911	2.99	1,902	635	8'x' 8	320	107	.16
1912	1.21	754	623	do.	150	123	.19

In considering the above figures, the fall in the yield of the trees planted in 1906 is very noticeable, the cause being due chiefly to coffee leaf disease. The 1907 plot has benefited by the eradication of the perennial weed *lumbugu*, a species of couch-grass. The trees planted in 1910 are particularly fine trees, hence their large yield.

The poor yield of the trees planted in 1911 is due to the ground having been heavily cropped with sweet potatoes, and the trees have never done well.

Coffee Leaf Disease: This disease was first noticed at Kakumiro on my taking over charge of the Plantation on July 25th, 1913. For a month or more previous to my arrival, no European had been in residence, and from the condition of the trees it would appear that the disease had been present about a month or more, as it had spread from the original plot, which was planted in 1906, to several other plots, though these other plots were only slightly affected, whereas the disease had got a very firm hold on the 1906 trees.

Pruning has been resorted to, letting in more light and air, and keeping the branches away from the ground, and this has given good results.

The disease has now unfortunately spread to all the coffee plots, though at the time of writing its presence was not very conspicuous.

Spraying with Bordeaux Mixture has now been commenced on the young trees, and, if this proves successful, the operations will be extended to the older trees.

RUBBER

Particulars of Measurements	Para planted 1906 20' x 20'	Funtumia planted 1906 8' x 8'	Ceara planted 1913 15' x 15'
Number of trees	367	77	350
Average girth at 3 feet	17.10 inches	17 inches	12 inches
Max. girth at 3 feet	26 "	24 "	21 "
Min. " " "	11 "	9 "	9 "
Average increase in girth in 8 months	1.77 "		
Max. increase in girth in 8 months	4 "		
Min. increase in girth in 8 months	1 inch		

Para Rubber: Tapping experiments have been carried out on a small number of trees, the results of which are shown in the table below.

The trees were tapped to one-third of their circumference on the half-herring bone system on alternate days, the trees in Group No.1 being tapped to a height of 5 feet and those in Group No. 2 to a height of 4 feet.

One tree in Group No. 1 and three trees in Group No. 2 gave no yield over the greater part of the tapping periods.

PARA TAPPING YIELDS

Groups	Number of trees	Average girth at 3 feet inches	Months tapped	Number of trees tapped	Biscuit rubber	Scrap rubber	Total rubber	Average per tree	Average per tree per 100 tappings
					ozs	ozs	ozs	ozs	ozs
No. 1	6	21 $\frac{2}{3}$	July	17	10	3 $\frac{1}{2}$	13 $\frac{1}{2}$	2.25	13.23
			August						
			September	13	5 $\frac{1}{2}$	$\frac{1}{2}$	6	1.00	7.69
No. 2	20	20 $\frac{11}{20}$	August	13	22 $\frac{1}{2}$	5 $\frac{3}{4}$	28 $\frac{1}{4}$	1.41	10.84
			September	13	15	2	17	.85	6.53

Cocoa: A small plot, .42 acre, has been planted up with cocoa 12' x 12' under banana shade planted at the same distance, the plants having been received from Kampala. *Cajanus indicus* has been sown between the rows to form a shade for the cocoa while the bananas are still young.

Silkworm trees: $\frac{1}{2}$ acre has been planted up with *Bridelia mycrantha* var. *ferruginea*, native name "Katasemiti", the native silkworm tree. When the trees are mature, they will be colonised with silkworms with a view to ascertaining whether their culture will prove successful as a native industry.

Much profit is at present made by the natives collecting the cocoons from the wild trees, and, if they prove easy of cultivation, quite a large native industry will be opened up.

Useful Trees: In addition to the native trees, "Nsambya" (*Dolichandrone platycalyx*) and "Muvule" (*Chlorophora excelsa*) are planted around the outskirts of the Plantation; there is also an avenue of *Widdringtonia whytei* about six years old, vacancies in which have recently been filled. The established trees are now giving a good supply of seed.

An avenue of *Grevillea robusta* has also been recently planted, while a number of young trees of various species are now in the nurseries and will be planted out when ready.

Miscellaneous Crops: An one acre plot was sown with cotton in August, 1913, and small areas were sown with Rose Cocus, Soya and native beans, and Maize, but none of these crops have done well owing to the drought. During March fresh plots of Rose Cocus and Soya Beans were sown, while native beans were sown between the young coffee.

J. D. SNOWDEN

Assistant District Agricultural Officer

Annual Report of the Veterinary Department

For the year ending 31st March, 1914

VETERINARY DEPARTMENT,
Kampala

To The Director of Agriculture, Kampala

Sir,

I have the honour to submit my Annual Report for the year 1913-1914.

Staff

Chief Veterinary Officer : E. HUTCHINS, M.R.C.V.S.

Veterinary Officers :

U. F. RICHARDSON, B. Sc., M.R.C.V.S.

E. H. BROGAN, M.R.C.V.S., TILL 13TH FEBRUARY, 1914

W. F. POULTON, M.R.C.V.S., FROM 20TH FEBRUARY, 1914

Stock Inspectors :

H. A. STRAUSS

T. TRANTER, FROM 17TH JUNE

Veterinary Assistants :

H. RAHMATULLAH

N. U. KHAN, TILL 30TH JULY

FAKHAR-UD-DIN, FROM 9TH SEPTEMBER

Clerk :

J. X. D'MELLO

Mr. Richardson went on leave on the 12th April, and spent two months studying in South Africa. He returned from leave on the 29th December.

Mr. Brogan proceeded on leave on the 13th February, 1914.

Mr. Poulton arrived on first appointment on the 20th February, 1914.

Mr. G. N. Hall was lent by East Africa from the 2nd November to the 16th December, 1913.

DISEASES OF CATTLE

RINDERPEST

1. Eastern Province. In the Busoga District there were several outbreaks of rinderpest near Jinja and in the neighbourhood of Iganga and Kamuli, which caused some heavy losses. Except for these this district has been fairly free from rinderpest.

In the Lango District there was no recurrence of rinderpest during the year, but the disease exists in the unadministered areas to the North and North East.

In the Teso District there were numerous small outbreaks of rinderpest in parts of the Kumi and Bukidea divisions. During October the disease was reintroduced into the Usuku division from Karamoja.

No outbreaks were reported during the year in the divisions of Serere and Soroti, in which extensive inoculations had been carried out in the previous year.

In the Bukedi District rinderpest was prevalent throughout the year in many parts of Budama.

There were severe outbreaks in Palissa and at Mbale during June and July. Other outbreaks were also reported in the South Eastern and North Eastern Bugishu divisions in January.

Inoculations with anti-rinderpest serum and virulent blood were carried out at Palissa by Mr. Brogan during June and July; when 1298 cattle were immunised in Palissa.

No further outbreaks have since been reported from this division.

At Mazi Massa in Bunyuli, 2179 cattle were immunised with serum and virulent blood during the outbreaks in July and August.

Further inoculations could not be carried out in the Eastern Province as the staff then available for inoculation work, one Veterinary Officer and one Stock Inspector, had to be withdrawn to deal with outbreaks in Buganda.

Except for the four months from June to September, there was no Veterinary Officer available for duty in the Eastern Province throughout the year, and it was not possible to continue the work of inoculation in Bukedi, where rinderpest has now become very widespread.

Considerable inconvenience has also been caused, as many cattle intended for transport have been held up until they can be immunised.

2. Northern Province. Outbreaks of rinderpest were reported in several parts of the Gulu and Chua Districts.

3. Buganda Province. Towards the close of September an outbreak of disease was reported in the South Eastern corner of Kiagwe in the Buganda Province.

The movement of all cattle across the Sezibwa river was immediately prohibited pending the investigation of the outbreaks. During the first week of October, when it had been definitely ascertained that the disease was rinderpest, the movement of cattle, sheep, and goats and of hides and meat, except under a veterinary permit, was prohibited in the county of Kiagwe and in the adjoining county of Bugerere. Restrictions were also placed on the movement of cattle, sheep, and goats in the Mengo District within the counties lying to the East of the Myanga river.

This is the first outbreak of rinderpest which has occurred in any of the Districts to the West of the Nile.

It has not been possible to ascertain how the disease was introduced across the Nile, but there can be no doubt that the infection was derived from the Eastern Province, which has never been free from rinderpest since 1910.

The infected area is comparatively small, but the percentage of deaths has been high and the losses in individual herds have been heavy.

Up to the time of writing the disease has been confined to within twenty-five miles of the Nile and to the South of the Jinja-Kampala road.

It was not possible to undertake any extensive inoculations at the commencement of the outbreak, and, since January, the disease has not appeared in any locality where cattle are numerous. About 450 cattle have been inoculated in Kiagwe, with, on the whole, satisfactory results. A fee of Rs : 1/- per head is charged for this.

Fifteen cases of rinderpest were treated in Kiagwe by Mr. Richardson with Potassium Permanganate on the lines suggested by Major G. K. Walker in the Journal of Comparative Pathology and Therapeutics for September, 1912. The results were most hopeful and fully warrant an extended trial of this drug in the treatment of individual cases.

Every effort is being made to confine the disease to the area already infected, and there is now some reason to hope that it may be stamped out before fresh centres of infection are set up in other parts of the Province.

The quarantine regulations have been well carried out by the chiefs concerned, or the infection would by this time have become widespread throughout this Province.

4. FOOT AND MOUTH DISEASE

An outbreak occurred in April in Kampala amongst some transport cattle which were employed in carting hides. The disease afterwards ran through all the other cattle in the station, and did not die out until early in June.

The disease is well known to the cattle-owning natives under the name of Eju or Ejwa, and although it does not appear to have attracted attention for many years I have no doubt that it has existed in the Protectorate for generations. The mortality, except in neglected cases in transport oxen, was trifling.

This disease had affected many of the herds in Singo and in Gomba earlier in the year, but without causing any serious losses.

5. TRYPANOSOMIASES

The Protozoologist, Miss Robertson, in the course of her investigations undertaken to ascertain the natural carrier of *T. pecorum*, has proved that the disease is naturally transmitted in Uganda by *Glossina morsitans*. *T. pecorum* has caused very heavy losses amongst cattle, especially in Buruli, in which *Glossina morsitans* had not hitherto been reported, until found by Miss Robertson.

Two hitherto unrecorded areas of *Glossina morsitans* were also found in Southern Ankole when I was on tour near the German border. In these areas there have been many losses amongst cattle from *T. pecorum* during the past six years. I consider it highly probable that further investigation in those localities where this disease is endemic will reveal other hitherto unrecorded areas of *Glossina morsitans*.

Recommendations were submitted with the Estimates for two additional Veterinary Officers and one Stock Inspector for work in connection with the mapping out of *Glossina morsitans* areas and the control of animal trypanosomiases generally.

Outbreaks which were in all probability of trypanosomiasis, but of which inspections could not be made, were reported in Singo, in Bunyoro, in Northern Ankole and in Southern Toro.

A number of the Government Transport oxen working on the Toro road were found to be infected with *T. pecorum* in February. The disease, although not new to Toro, appears to have only recently affected cattle working between Kibale and Fort Portal. I made an inspection of this route in March, but could find no tsetse then. Further investigation in the country through which one section of the road passes is, however, necessary, before assuming that these cattle did not previously come within reach of tsetse.

6. DISEASES OF SHEEP AND GOATS

Scabies of goats is very prevalent in Bukanja and Ngalama in Southern Ankole.

7. DISEASES OF EQUINES

17 mules suffering from lymphangitis were in quarantine at Kampala during the year. 11 advanced cases died or were destroyed. 3 cases treated in the earliest stages were cured. One pony and one donkey were treated and are still under observation.

In an Egyptian donkey and in a mule, which were sent in for treatment, trypanosomes of the *T. brucei* type were found. Both these cases died, the disease taking rather an acute course. The trypanosome from the mule which had probably become infected in Toro was sub-inoculated and investigated by Miss Robertson.

T. nanum was found in a donkey brought down from the Northern Province ; this animal was under treatment for three months and has now apparently recovered.

8. DISEASES OF DOGS

Three cases of trypanosomiasis in dogs were reported.

Piroplasmosis is very widely distributed, but the cases met with are seldom fatal if treated with trypanblau.

No cases of rabies have yet been found, but this disease has been reported in British East Africa.

9. EXPORTATION OF CATTLE

No trade cattle were exported to British East Africa during 1913-14.

The purchase and shipping of the cattle required for the production of anti-rinderpest serum at the Veterinary Laboratories, Nairobi, was discontinued during the prevalence of foot and mouth disease in Kampala, but has not been seriously interrupted since July.

10. KAMPALA SLAUGHTER HOUSE RETURNS

From 1st April, 1913, to 31st March, 1914.

1913.

Months.	Goats.	Sheep.	Cattle.
April	261	125	79
May	265	98	88
June	299	98	91
July	284	94	91
August	223	104	79
September	201	71	87
October	250	106	97
November	146	1	95
December	108	47	80

1914.

January	173	49	85
February	218	86	59
March	184	49	56
Total	2,612	928	987

11. JINJA SLAUGHTER HOUSE RETURNS

From 1st April, 1913, to 31st March, 1914.

1913

Months	Goats	Sheep	Cattle
April	10	78	18
May	—	6	19
June	2	3	26
August	21	29	13
September	23	17	29
October	18	28	22
November	28	27	15
December	2	9	23

1914.

January	8	19	15
February	3	—	17
March	5	6	22
Total	120	222	219

12. CASES TREATED AT THE VETERINARY DISPENSARY

Mules	29	Cattle	216	Dogs	132	Cat	1
Horses	5	Donkeys	6	Parrot	2	Goats	6
		Fowls	8	Monkey	1		

13. SUMMARY OF SLIDES EXAMINED, 1738

Cattle		Equines	
East Coast Fever	7	Trypanosomes	33
Piroplasma	6	Cryptococci	2
Trypanosomes	158	Scabies	12
Filaria	1	Negative	96
Negative	762		
Dogs		Sheep and Goats	
Piroplasma	20	Trypanosoma	73
Filaria	19	Scabies	2
Trypanosomes	89	Negative	89
Negative	225		
Game			
	Negative	34	
	Water Buck	9	
	Kongoni	6	
	Bush Buck	7	
	Buffalo	12	

In the above are included the slides examined daily from several strains of trypanosomes which were kept going at Kampala since September.

14. SAFARI WORK

During the past year I made tours of inspection in the Buganda Province through Singo and Gomba in May, and through Buruli and Bulemezi in November.

In the Eastsern Province I toured part of the Bukedi District in June and July. In the Western Province to Ankole in August, and to Toro in March.

15. CONCLUSION

As a result of the inoculations carried out in 1911-12 and 1912-13 in Lango and Teso, these districts have remained almost free from rinderpest during the past year, whereas there have been continual losses in those parts of the Bukedi District which contained many susceptible cattle.

Although rinderpest has not spread beyond Kiagwe, so long as the infection exists to the West of the Nile, there is a constant danger that the infection may be carried to some other part of the Province, and should this happen it will be practically impossible to prevent its extending into and over the Western Province.

It has been shown by Miss Robertson, the Protozoologist, that *Glossina morsitans* is the natural carrier, and if not the sole carrier, certainly the most important, of *Trypanosoma pecorum* in Uganda.

When investigation has been made of all the localities in which trypanosomiasis of cattle is known to exist, and the areas in which *Glossina morsitans* probably occurs have been accurately mapped and defined, it will then be possible to avoid many of the losses from these diseases, which carry off a very considerable number of cattle each year in the Buganda and Western Provinces.

E. HUTCHINS

Chief Veterinary Officer

No. 27/P. 99/14.

GOVERNMENT ENTOMOLOGIST'S OFFICE,
Entebbe, Uganda,
May, 1914.

Sir,

I have the honour to submit my Annual Report for the year 1913-1914.

The most important pests of the principal crops are dealt with in detail below.

INSECTS ATTACKING COFFEE

1. Coffee Borers

During the year under review these insects have proved themselves to be the most destructive of the insects attacking coffee. They are dealt with in the order of their importance.

The Coffee Berry Borer

Stephanoderes coffeae, Haged.

This beetle began to make its presence felt in 1908-1909, and in 1913 it was exceedingly numerous; during the intervening years, although ubiquitous, it was not to be found in large numbers on any one plantation. Not only does this insect damage the berries while on the trees; but berries apparently sound when cured and stored have been found to be eaten out, leaving only dust in the parchment, by this beetle on a later examination. The obvious explanation is that the apparently sound berry contained eggs, which were not killed by the heat given off during the fermentation, and the larvae which hatched from these eggs fed on the seed contents.

The life-history of this insect has been given in previous reports. Experiments to discover a means to control this pest are being carried out on the plantation on which the greatest loss is being caused, but at present it is too early to give any deductions as to the success or otherwise of these experiments. I suspect the insect to have an alternate host, and if this point be settled in the affirmative, it could be used to assist in the control of the pest.

The Yellow-Headed Coffee Borer

Dirphya (Nitocris) princeps, Jord.

A short account of this insect by me appeared in the Bulletin of Entomological Research, Vol. IV., and, in view of the local circulation of the report, the article re-appears here.

The first time that this beetle proved itself to be a pest on coffee to any great extent in this country was in 1910 on the native coffee, *Coffea robusta*, in the Chagwe District. I began investigations at that time. Since the first outbreak, it has been found attacking *C. arabica* on several estates. Some of the estates have been seriously attacked, especially the older estates, which are badly attacked by the coffee leaf disease, *Hemileia vastatrix*. With a single exception I have been able to trace the inception of the outbreak to have been in plots in which the above disease had started and, consequently, in which the trees were the least vigorous.

I have called the beetle the Yellow-headed Coffee Borer to distinguish it from the other coffee borers of the family *Bostrichidae*. It belongs to the family *Cerambycidae*, subfamily *Lamiinae*, division *Phytoeciides*. *Nitocris* is an Ethiopian genus well represented in West Africa. There are at least eight other representatives of this genus in Uganda, but the only common species is *N. delecta*, Gahan, from which, however, *N. princeps* can be easily distinguished. I do not know the food plants of any of the other species of *Nitocris*. In German East Africa, according to Morstat*, *N. usambicus*, Kolbe, is also responsible for great injury to coffee.

*"Der Pflanze" No. 5. 1911.

Description.—The egg is light brown in colour, 3.2 mm. in length; 1.1 mm. in breadth.

The larva is ivory coloured ; head well formed, wider than the body, dark brown, with sharp dark mandibles, occiput dark brown ; segments of the body with callus-like protruberances on the dorsum ; last segment sparsely hirsute. Length 30 to 33 mm. ; breadth 4.2 mm.

The pupa is dark brown and somewhat larger than the adult.

The beetle with the exception of the head is black ; head yellow ; antennae somewhat longer than the body, basal segment yellow, remaining segments black, shading to brown near the tips ; prothorax yellow, remainder of thorax black ; elytra black, apex brownish black, with rows of punctures ; wings black, protruding slightly beyond the elytra ; venter black, basal half covered with silvery hairs ; legs black. The length 34 mm. ; females slightly larger than males.

Life-History.—The female beetle loosens a bit of the bark on the branch from four to six inches from the tip and lays its eggs under the bark. The eggs are laid singly.

The young larva bores into the branch until it reaches the wood on which it feeds, and continues boring its way to the stem. It turns downwards, continuing to feed on the wood, forming a large tunnel which often cuts into the cambium. The tunnels in the stem continue to the surface of the ground and often extend into the main root ; sometimes they are as much as four feet in length, for the larva has to consume large quantities of such dry woody food to obtain sufficient nutriment for its development. The larva is very agile, ascending or descending in its tunnel with great rapidity. At distances varying from two to four or five inches, horizontal tunnels are bored from the vertical tunnel to the outside of the branch or stem. The exits of these tunnels are about 1.5 mm., to 2 mm., and are all on the same side of the tree. They are made for the purpose of getting rid of the frass (excrement and wood dust).

When full growth is attained, the larva ascends the tunnel for about half an inch and forms a pupal chamber by forming a partition above and beneath. The reason for this ascent is probably to escape the slight moisture which may collect at the bottom of the tunnel. As soon as the transformation from the pupa to the beetle is completed, the beetle eats its way out of the stem. The beetle has not been observed to feed either on the leaves or on the bark.

As is usual with members of this family, the life-history is a protracted one. My observations lead me to the conclusion that it occupies between two and three years. Larvae of various sizes can be found throughout the year. The pupal stage lasts for from seven to nine weeks, usually from November to December.

Treatment.—It is an easy matter to locate the trees that are attacked by this borer, as the frass can be quickly spotted near the base of the trees. The branch through which admittance to the stem is gained can usually be readily spotted, either by the openings of the horizontal tunnels or by the tips of the branches being black. The latter, however, is not a sure sign of the presence of the grub, as the blackening may also be due to "die-back".

If the presence of the grub is detected in the branch before it has reached the stem, the obvious and easiest way to get rid of the insect is to cut off the branch and burn it. On the other hand, if the presence of the grub is not detected before it reaches the stem, the control measure which I have recommended, and which has been successful in every case, is to inject a few drops of carbon bisulphide or carbon tetrachloride into the tunnels of the borer. This operation is best carried out by sealing up all the horizontal tunnels in the stem with wet clay, cutting off the branch through which the insect entered the stem as close to the stem as possible, which gives one a large hole through which a few drops of the liquid can be conveniently injected. The hole is then sealed with wet clay. A bicycle oil can will be found to answer the purpose of the injection very satisfactorily. As the vapour of either carbon bisulphide or carbon tetrachloride is heavier than air, it sinks rapidly to the bottom of the tunnel and kills the grub. The former substance is *extremely inflammable* and consequently, the operator should not open the bottle containing that liquid while near a fire or smoking. After the operation is finished it is advisable to brush away the frass from near the base of the trees, as then if no frass is found on the next visit it may be concluded that the insect is dead. It may often be found necessary to repeat the operation a second, or even a third, time, as it may be attacked by another borer entering the stem by another branch after the first injection. Neither of the above liquids has any deleterious effect on the trees.

Trees attacked by *N. princeps* if allowed to remain untreated are either killed outright or broken off by the wind on account of the extensive tunnelling. This insect does not appear to attack trees younger than two years old.

THE BOSTRYCHID COFFEE BORERS

Apate indistincta, Murr.

Apate monacha, F.

The number of borers belonging to the family *Bostrychidae* which attack various crops and timber in Uganda is large. Since the outbreak of coffee leaf disease in 1912 stem borers have become very prevalent.

The life-histories of these pests have not been worked out. Unlike *N. princeps* more than one adult may be found in the same burrow; unlike that insect, too, the burrowing is always upwards.

Treatment.—As in the case of *N. princeps*, it is easy to discover the trees which are attacked by these borers on account of the expulsion of the frass near the base of the trees. As the insects burrow upwards a heavy gas such as the vapour of carbon bisulphide or carbon tetrachloride is of little avail.

Benzene has been used with good results. The orifice should be cleaned out and in perfect communication with the burrows by removing the frass by means of a piece of wire bent at one end to form a hook. Two or three pieces of cotton wool soaked in benzene should be introduced into the tunnel, taking care not to press them. The orifice should be sealed with Plaster of Paris or wet clay; the former is much preferable. The benzene in volatilizing fills the burrows with its vapours and asphyxiates all the insects therein.

4. LEAF-EATING CATERPILLARS

Parasa sp.

This insect belongs to the family of moths, *Limacodidae*. The larvae feed on the leaves, and when they are present in large numbers they quickly defoliate the trees.

The eggs are flat and laid in over-lapping rows. The larva is slug-like, with a distinctly segmented body bearing several irritating spinous tubercles. Pupation takes place in a hard, oval cocoon, one end of which opens with a lid for the emergence of the adult. The cocoons are arranged around the stems or branches. The pupal stage occupies between six and eight months. The thorax of the moth and the middle of the forewing are green; the outer margin of the forewing is brownish grey; the dorsum of the abdomen is dark brown; the sides of the abdomen and hindwings are creamy yellow; the legs are black; the general colour of the wings beneath is pale green.

Two species of cuckoo wasps (*Chrysididae*), *Chrysis lyncea*, Fab., and *C. aurovirens*, Moiss. (Sp. nov.), have been reared from the cocoons of this insect.

5. *Metadrepna Glauca*. Hamp

This leaf-eating caterpillar is the larva of a moth belonging to the family *Drepanidae*.

The larvae vary in colour from brown to green; the anal prolegs are absent; the body is without hairs and ends in a tail-like process. The adult is a reddish-brown moth, with an expanse of wings about $1\frac{1}{2}$ inches.

The life-history has not been worked out in detail; the cycle is quickly completed. The larvae pupate in a cocoon amongst the leaves. The manner in which the larvae eat the leaves is very characteristic; in badly eaten leaves only the midrib remains undevoured.

The best insecticide for use against these leaf-eating caterpillars is chromate of lead used at the rate of 3lbs. to 100 gallons of water.

6. Crickets

Gryllotalpa africana, P. de B.,

Gryllus bimaculatus, de G.

These insects confine their attacks to the nurseries and young plants in the fields. In the former they are most destructive where heavy shading is practised. The destruction lies not so much in the satiation of their appetites as in the wanton manner of cutting off the young plants near the surface of the soil in excess of what is required for food. They also cause some loss by digging their burrows near the roots of the delicate young plants.

G. africana lives and deposits its eggs in burrows. These burrows are deep, as this insect is well provided for digging in having powerful toothed forelegs and the head and thorax rounded and well chitinized. The burrows are dug in light, moist soil. The nature of the soil and the depth to which it is drained determine the depth of the burrows. The insects penetrate deep into the soil during the hot, dry weather and when the rains begin they remain nearer the surface, which fact is caused by the rise of the soil water and the surface being cooler.

G. bimaculatus lives on the surface of the ground under leaves and other debris, making short burrows into which they disappear when disturbed, but which they do not habitually occupy.

The adults of both species fly at night and are attracted by light.

Control Measures.—The crickets that live in burrows are more difficult to control than the surface living ones.

As a preventive measure against crickets, shading of the nursery should not be heavier than is necessary for the growth of the seedlings and the nursery should be well drained, as good drainage not only causes the burrows to be deeper, and hence there is less risk of damage to the roots, but makes the conditions less favourable for these insects. In the case of *G. bimaculatus* no debris should be left lying around the nursery to harbour this species, unless to be used as traps, as mentioned below.

Several remedial measures have been tried against these insects, the most successful being—

(1). Baits.—This consists in placing near the burrows a mixture of flour and sugar, to which a poison, such as arsenate of lead or Paris Green, has been added.

(2). Kerosene and Sand.—Spreading this mixture around the plant attacked acts as a repellent: but, as the oil evaporates, it needs to be renewed frequently.

(3). Debris Traps.—In the case of *G. bimaculatus* small heaps of rubbish or palm leaves should be placed about the nursery as places of concealment for the insects, and such places should be visited daily, preferably at mid-day, and the insects found thereunder destroyed.

7. Scale Insects

Coccidae.

The list of Coccids attacking coffee in Uganda is a continually growing one. At present those known to attack this crop are :—

- a. *Dactylopius (Pseudococcus) citri*, Risso.
- b. *Pulvinaria psidii*, Mask.
- c. *Ceroplastes ceriferus*, And.
- d. *Ceroplastes galeatus*, Newst.
- e. *Ceroplastes vinsonioides*, Newst.
- f. *Lecanium africanum*, Newst.
- g. *Lecanium viride*, Green.
- h. *Stictococcus gowdeyi*, Newst.
- i. *Aspidiotus (Sclerodermus) articulatus*, Morg.
- . No. 3345.
- k. No 4540.
- l. No 4541.

C, j attack only the stems : h attacks both the stems and leaves ; a, i attack fruit and leaves ; f, g attack fruit, stem and leaves. These insects do not restrict themselves to coffee as their only food plant, for, with the probable exception of *L. africanum*, all are known to have other food plants.

To produce marked results, spraying must be thorough and sprays should be applied at the time when the scale insects are in the least protected stage, namely, when the newly hatched larvae have left the protection of the parent scale and are moving about in search of a site on the tree on which to settle. The sprays to be used against these insects have been dealt with in previous reports.

8 The Mediterranean Fruit Fly

Ceratitis capitata, Wied.

This fruit fly was as prevalent as during the previous year.

Several experiments were made using kerosene oil as a bait. This measure is said to have been used with success in Australia, but here it has met with little success. The proportion of females to males attracted to the oil was very small. The oil was put in tins suspended from the branches. In addition to the above fact, the oil evaporates too rapidly.

9 Cutworms

These caterpillars have been very prevalent during the period under review.

The following baits have been tried with moderate results.—

1. Arsenite of soda.....1 lb.,
 Sugar.....8 lbs.,
 Water.....10 gals.

The arsenite of soda and sugar are dissolved in the water and used to moisten some sort of succulent vegetation, which has been cut into small pieces. This bait should be thrown broadcast on the ground as soon as the attack is observed.

2. Flour..... 60 lbs.,
 Paris Green.....1 lb.,
 Sugar.....8 lbs.,
 Water, enough to make a dough.

This bait should be placed around the base of the plants.

In small plantations, or in restricted attacks, it is practicable to dig out and destroy these caterpillars, as they are usually to be found within a radius of four inches of the stem and at a depth not greater than three inches below the surface. There is no reason why such an attack cannot be checked by a systematic search for the grubs without having to resort to the use of poison baits.

INSECTS ATTACKING COTTON

Investigations on the cotton pests were carried out on the Kadunguru Farm. The life-histories of two species of "stainers" and of the Leaf-Footed Plant Bug were worked out with the view of proving whether or not it is possible to discriminate readily in the field between the damage done by these insects on bolls of varying degree of maturity after the elapse of some days between the attack by the insects and the examination. The life-history of the bollworm, *Earias insulana*, was also worked out.

These investigations lead me to conclude that—

(a) Although in a laboratory it may not be impossible to discriminate between the damage caused by the several plant bugs, in the case of an examination in the fields to ascertain the damage caused by any one of the plant bugs belonging to either the *Coreidae* or *Pyrrhocoridae* the conclusions based on such an examination, especially when made after the elapse of some time between the attack and the inspection, are certain to be misleading.

I do not include the bollworm amongst these insects, the damage caused by which may be mistaken for that caused by the plant bugs, or *vice-versa*. Yet, it is a question whether some of the square shedding usually attributed to that insect may not, for instance, be justly attributable to the *Dysdercus* and *Oxycaenus*, or even to the *Nezara*.

(b) The most essential factor in determining the damage to unopen bolls by plant bugs, as a whole, is the appearance on the inner side of the carpels of a dark spot surrounded by a blister-like area at the point at which the insects' setae entered. In rapidly growing bolls a physiological reaction in the form of a proliferation results at this point.

(c) The effect of the plant bugs, in particular *Leptoglossus* and *Dysdercus*, on cotton bolls is governed by the degree of maturity and the rapidity with which the bolls mature.

(d) A damaged dry boll furnishes by itself no direct evidence of the cause of its condition.

1 The Spiny Bollworm

Earias insulana, Boisd.

The eggs are laid on various parts of the cotton plant, but preferably on the bolls and particularly in the grooves near the apex of the bolls, on the involucre, and on the terminal buds. They are laid singly and after dusk. A moth kept under observation in the field laid a total of 210 eggs in five consecutive nights. On the first night 87 were laid, on the second 60, on the third 42, on the fourth 14, and on the fifth 7. But, as larvae in all stages of growth may be found at the same time points to the fact that the egg-laying period may extend over a much longer time.

The newly hatched larvae wander around in search of bolls, squares, or terminal buds, into which they bore. Several squares and bolls may be destroyed by the same larva. In the case of bolls the larva enters near the base and its presence can be quickly detected by the excrement pushed through the hole. The larva on wishing to leave the boll returns through the same hole by which it entered.

When the bollworm attains maturity it comes out of the boll on which it has been feeding and spins a cocoon within which it pupates usually inside the involucre, but not necessarily within the involucre of the boll on which it last fed. The moths are of nocturnal habits. During the daytime the favoured place for hiding appears to be between the involucre and the boll.

Life-History.—There are several generations of this insect during a season. The greater damage to cotton is done by the later generations, since the bolls are near maturity.

Table 1 Showing the Duration of the Stages of the Bollworm,

Earias insulana, Boisd.

Experiment	Incubation Period	Larval Period	Pupal Period
1	Dec. 16 - 20	Dec. 20 - Jan. 3	Jan. 3 - 15
2	Dec. 16 - 20	Dec. 20 - Jan. 3	Jan. 3 - 13
3	Dec. 18 - 24	Dec. 24 - Jan. 6	Jan. 6 - 16
4	Dec. 18 - 22	Dec. 22 - Jan. 5	Jan 5 - 19
Length of period in days.	4 to 6	14 to 15	10 to 14

Damage to Cotton.—The effect on the squares is that the involucre opens prematurely, and the squares turn yellow and drop.

When bolls are attacked the seeds are destroyed, the lint is matted together by the excrement, the bolls split prematurely and the lint does not mature. When very young bolls are attacked they wither and remain on the plant without opening.

The loss is further accentuated by (1) bacterial action which usually sets up in the boll, doubtlessly induced by the presence of excrement, and (2) the holes through which the larvae enter the bolls may allow of the entrance of the spores of saprophytic fungi.

Food Plants.—The bollworm so far as known has for its food plants only members of the family *Malvaceae*, of which *Hibiscus esculentus*, *Abutilon* sp., and an unidentified plant are common east of the Nile.

METHODS OF CONTROL.

Remedial Measures.—Rows of *H. esculentus* should be grown at intervals throughout the fields as traps and destroyed when they are observed to contain larvae.

To insure against the multiplication of the pest during the first generation on cotton, all the bolls, squares and terminals showing signs of the insect should be destroyed. It is at this time and by this means that the greatest blow can be given to this pest.

Preventive Measures.— A search should be made in the vicinity of the cotton plots for the uncultivated malvaceous plants and these should be destroyed.

As a consequence of an attack of bollworms, the beetles *Carpophyllus mutillatus*, Erich., *C. binotatus*, Murr., and *C. luridus*, Murr., of the family *Nitullidae* are usually found in the bolls. Members of this family live in the bores of other insects feeding on the sap of the decaying tissues. They are scavengers of no economic importance, but when seen in cotton bolls evoke the suspicion that they are the perpetrators of the damage, whereas they are the followers of decay.

2. Cotton 'Stainers'.

Dysdercus nigrofasciatus, Stal.,

Dysdercus pretiosus, Dist.,

Oxycaraenus, hyalipennis, Costa.,

Oxycaraenus gossipinus, Dist.

The two representatives of the former genus appear to be equally abundant. Of the other genus *O. hyalipennis* is markedly the more abundant.

Dysdercus pretiosus, Dist.

The eggs are laid unattached in irregular masses under fallen leaves, at the roots of plants, and sometimes in the squares and open bolls. The number of eggs laid in captivity varied from 75 to 100. The period of incubation is from 7 to 9 days.

The bug passes through five instars. On hatching it is yellow, which soon changes to red, and about 1.5 mm. in length. After the first moult, it measures 2 mm. in length and during this instar the odoriferous glands on the abdominal dorsum appear. After the second moult, the rudimentary wings appear as pads on the mesothorax and metathorax; the bug measures 4mm. After the third moult, it measures 6mm. and there now appears a difference in the size of the sexes, the females being the larger. After the fourth moult the insect measures 8 to 9 mm., and after the fifth and final molt the adult appears and measures from 13 to 15 mm.

All the stages of the bug may be found at the same time, feeding more or less gregariously. They are conspicuous, a habit agreeing well with the warning colouration and protective odour. The nymphs as well as the adults are active runners, the latter seldom flying. Copulation occupies about 30 to 36 hours. Oviposition takes place some days later; the adults may live for a long time.

Table 2 Showing Periods of Incubation and Moults.

Number	Incubation Period	Period of Moults.					Length of Life-Cycle in Days.
		1	2	3	4	5	
1	Dec.14-22	Dec.22-25	Dec. 25	Jan.5-13	Dec. 23	Dec. 22	85
			Jan. 5		Jan. 22	Jan. 10	
2	Dec.14-25	Dec.25-28	Dec. 28	Jan.6-12	Dec. 21	Dec. 21	69
			Jan. 6		Jan. 14	Jan. 8	
3	Dec.14-21	Dec.21-26	Dec. 26	Jan.2-11	Dec. 21	Dec. 21	66
			Jan. 2		Jan. 12	Jan. 6	

Food Plants.—This “stainer” has been observed to feed on *H. esculentus*, *Asclepias lunata*, and the *Euphorbia* used as a fence around cattle kraals.

Damage to Cotton.—It is impossible to discriminate between the damage done by this insect and that by the *Oxycaraenus* and, consequently, it is impossible to arrive at an estimate as to the loss caused by either of these bugs separately.

The main attack is on the green boll. The sap is sucked from the mass of developing lint, with the result that the boll splits prematurely and the fibre does not mature. When very young bolls are attacked they drop off.

The attack on the more mature and unopen bolls is less destructive to the lint ; but after the bolls open the insects suck the seeds and stain the lint with the excrement. Also the young hatch in the open bolls and get crushed in the picking and ginning operations, thereby staining the lint.

As in the case of *Leptoglossus*, rapidly developing bolls damaged by this insect usually show a proliferation of the tissues on the side of the carpels at the point of entrance of the insect's setae.

METHODS OF CONTROL

Remedial Measures. As recommended for the control of the boll-worm, *H. esculentus* should be used as a plant trap for this insect.

Another kind of trap that has proved successful is the “debris trap”. This consists in placing seed cotton or damaged bolls in and around the fields for the bugs to feed on and to hide in. Such traps should be visited daily and the insects destroyed.

Hand-picking would prove to be both practicable and remunerative. This can be done by shaking the bolls containing the insects over a receptacle containing water to which some oil has been added;

Preventive Measures.—The cotton plants should be destroyed as soon after the picking of the cotton is finished as possible.

The uncultivated food plants mentioned above in the vicinity of the fields should be destroyed.

Oxycaraenus hyalipennis, Costa.

The eggs are laid loosely in twos or threes or singly, in open and partially open bolls. The period of incubation is from 6 to 8 days. The young insects are very agile. All the stages may be found together throughout the season.

Table 3 showing Duration of Moults of *O. hyalipennis*, Costa.

Number.	Incubation Period	Periods of Moults					Period of Life-Cycle in Days.
		1	2	3	4	5	
1	Dec. 17-23	Dec. 23-27	Dec. 27-Jan. 5	Jan. 5-16	Dec. 17-29	Dec. 29-Jan. 14	58
2	Dec. 20-28	Dec. 28-31	Dec. 31-Jan. 8	Jan. 8-21	Dec. 17-29	Dec. 29-Jan. 14	60
3	Dec. 21-27	Dec. 27-31	Dec. 31-Jan. 9	Jan. 9-22	Dec. 17-31	Dec. 31-Jan. 18	64

Damage to Cotton.—The adults by sucking the juices from the young bolls cause boll shedding. Colonies of “stainers” attacking open bolls suck the juices from the seeds, thereby causing “light seed”, matting of the fibre, and dirty the fibre with molted skins and excrement. Moreover, “stainers” are crushed during the picking and ginning operations, resulting in stained cotton.

The food plants are the same as those of *Dysdercus*. The methods adopted for the control of this insect are the same as the above.

3 The Leaf-Footed Plant Bug.

3. *Leptoglossus membranaceus*, Fab.

The eggs are laid in rows, end to end ; the number varying from 20 to 35. They are laid on any part of the plant, most often on the stems of the bolls.

Table 4 Showing Egg-Laying Capacity of Females.

Experiment.	Date Females Collected.	Number of Females.	Average Number of Eggs per Female.	Maximum Number of Eggs per Female
1	Dec. 16	6	22	32
2	Dec. 28	6	24	30
3	Jan. 2	6	20	35

The eggs hatch in from ten to fourteen days. After the insects pass the first instar they feed separately. They moult five times before the adult stage is reached. The adults are quick fliers.

Table 5 Observation on Durations of Nymphal Stages.

Number of Moults.	Duration of Moults.	Maximum Number of Days.	Minimum Number of Days.	Average Number of Days.
First	Dec. 17-27	10	10	10
Second	Dec. 19-30			
	Dec. 19-29	11	9	10
	Dec. 19-28			
Third	Dec. 24-Jan. 5	11	10	10.5
	Dec. 24-Jan. 4			
Fourth	Dec. 25-Jan. 2	12	8	10
	Dec. 25-Jan. 6			
Fifth	Dec. 23-Jan. 10			
	Dec. 23-Jan. 13	21	18	19.5
	Dec. 23-Jan. 11			

Damage to Cotton.—The objective point of attack of this insect is the seed, which it is able to reach with little difficulty by means of its thread-like seta. It either completely eats away the contents of the seeds or partially consuming them causes "light seed". The lint around the seeds becomes matted. Bacterial action usually sets up, further accentuating the damage. As in the case of *Dysdercus* blister-like proliferations are caused. In common with the bollworm premature splitting of the bolls often occurs.

Food Plants.—The other known food plants of this insect are three species of *Cucurbitaceae*.

Control Measures

Remedial.—Hand-picking is practicable when the cotton is grown in small plots and when the nymphs are small.

The use of any of the above food plants as "plant traps" to be destroyed as soon as they are found to contain any of the pest.

Preventive.—Clean cultivation and the destruction of the uncultivated food plants in the vicinity of the cotton plots.

4 The Green Fly

Aphis gossypii, Glover.

East of the Nile this *Aphis* is preyed on to an extraordinary extent by the so-called "lady-beetles" (*Coccinellidae*). At Kadunguru Farm hardly a plant attacked by *Aphis* is without some member of this family. There were six species of these predaceous beetles to be found and those which I have been able to identify are *Chilomenes lunata*, Fab., *Solanophila bosci*, Ws., *Epilachna chrysomelina*, Reiche, var., *Chilocorus angolensis*, Or.

5 Scale Insects

Pulvinaria jacksoni, Newst

This Coccid is so scarce that it can hardly be ranked as even a minor pest.

6 Grasshoppers

Zonocerus variegatus, Linn

A small swarm of this grasshopper began in a large plot of cotton to rapidly defoliate the crop, but they were easily checked by using Paris Green applied as a powder.

INSECTS ATTACKING CACAO

1 Cacao Fruit Fly

Ceratitis punctata, Wied.

Similar experiments with kerosene oil to that referred to under *C. capitata* were carried out with similar results.

2 Cacao Beetle

Adoretus hirtellus, Castn.

Few reports were received of damage caused by this insect this year

3 Green Fly

Toxoptera theobromae, Schout

Several complaints of attacks by this bug were received after the early rains, but they proved to be easily amenable to treatment with whale oil soap.

4 Scale Insects

The only two species of Coccids known to attack this crop locally are *Stictococcus dimorphus*, Newst., and *Pseudococcus (Dactylopius)* sp. The former, which was so bad in the Botanic Gardens, often covering the pods completely, has almost been got rid of by spraying systematically on the appearance of the young.

The other species has only been reported from two estates.

5 Crickets

Gryllotalpa africana, P. de B.

Gryllus bimaculatus, de G.

Gryllus gracilipes, Sauss.

The first and second species of these crickets were dealt with under the "Insects Attacking Coffee". The habits of the third species are very similar to those of *G. bimaculatus*.

6. Millipedes

Odontopyge sp. (?)

This millipede was reported to have attacked freshly planted cacao beans and very young seedlings causing large loss on one estate. Soaking the beans for one hour in a solution of corrosive sublimate (1:1000) would most probably prove remunerative.

INSECTS ATTACKING RUBBER

1 Leaf-Eating Caterpillar

Glyphodes ocellata, Hmp.

The larva of this moth feeds on the leaves of *Funtumia elastica* and *F. latifolia*. It eats the green tissues of the leaves at the tips and margins. It pupates within the rolled margins of the leaf.

2 Scale Insects

The scale insects attacking rubber are *Pulvinaria psidii* Mask, on *Funtumia elastica*; *Chionaslis funtumiae*, Newst. (Sp. nov.) on *F. latifolia*; No. 3518 on Ceara; No. 3720 on Para.

3 Borers

Xyleborus confusus, Erich.,

Xyleborus affinis, Erich.,

Xyleborus camerinus, Haged.

These three species of borers of the family *Scolytidae* attack Para rubber trees at the cicatrices made by the tappers. They can be driven away by painting the trunk with coal tar.

INSECTS ATTACKING STORED GRAIN

Several enquiries were made with regard to the treatment for stored grain attacked by the beetle *Bruchus chinensis* (?), the rice weevil, *Calandra oryzae*, Linn., and the Indian Meal Moth, *Plodia interpunctella*, Hb. The treatment recommended was fumigation with carbon bisulphide or carbon tetrachloride.

The following is a list of insects, compiled either from personal observation or from reports and specimens sent in, which were of some economic importance during the year

1. Order ORTHOPTERA

Species of Insects		Crops Attacked.
Family	<i>Aceridiidae</i>	
	<i>Acridium lineatus</i> , Stoll.	Cotton
	<i>Atractomorpha aurivillii</i> , Boll.	"Nsambyia", Cotton
	<i>Phymateus viridipes</i> , Stal.	Cotton
	<i>Taphronota ferruginea</i> , Fab.	"
	<i>Zonocerus variegatus</i> , Linn.	"
Family	<i>Locustidae</i>	
	<i>Conocephalus nitidulus</i> , Scop.	Maize, millet
	<i>Conocephalus obscurus</i> , Walk.	" "
Family	<i>Gryllidae</i>	
	<i>Gryllus bimaculatus</i> , de G.	Coffee, cacao
	<i>Gryllus gracilipes</i> , Sauss.	Cacao
	<i>Gryllotalpa africana</i> , P. de B.	Coffee

2 Order ISOPTERA

Family	<i>Termetidae</i>	
	<i>Termes bellicosus</i> , Linn.	Cacao, coffee, timber, etc
	<i>Termes</i> sp.	Coffee, timber.

3 Order HYMENOPTERA

Family	<i>Apidae</i>	
	<i>Xylocopa nigrita</i> , Fab.	Timber
	<i>Xylocopa flavorufa</i> , de G.	"
	<i>Xylocopa torrida</i> , Westw.	"

4 Order COLEOPTERA

Family	<i>Melolonthidae</i>	
	<i>Schizonycha profuga</i> , Per.	Roses
Family	<i>Rutelidae</i>	
	<i>Adoretus hirtellus</i> , Castn.	Cacao, coffee
Family	<i>Dynastidae</i>	
	<i>Oryctes boas</i> , Oliv.	Palms
	<i>Oryctes monocerus</i> , Fab.	"

	Species of Insects	Crops Attacked
Family	<i>Cetoniidae</i>	
	<i>Rhabdotis sobrina</i> , G. & P.	Roses
	<i>Diplognatha gagates</i> , Fab.	"
Family	<i>Bostrychidae</i>	
	<i>Apate monacha</i> , Fab.	Cotton, coffee
	<i>Apate indistincta</i> , Murr.	Coffee
	<i>Sinoxylon senegalense</i> , Karsch.	Timber
	<i>Xylion adustum</i> , Fab.	"
	<i>Heterobostrychus brunneus</i> , Murr.	"
Family	<i>Buprestidae</i>	
	<i>Psiloptera piperata</i> , Murr.	Mvule
	<i>Megactenodes westermanni</i> L. & G.	"
Family	<i>Meloidae</i>	
	<i>Mylabris bifasciata</i> , Gerst.	Beans
	<i>Mylabris amplexans</i> , Gerst.	Cotton
Family	<i>Chrysomelidae</i>	
	<i>Conchyloctenia punctata</i> , v. <i>parummaculata</i> , Boh.	Sweet Potatoes
	<i>Hypercantha castanea</i> , Allard.	Cucumber, vegetable marrow
Family	<i>Bruchidae</i>	
	<i>Bruchus chinensis</i> (?)	Stored Grain
Family	<i>Cerambycidae</i>	
	<i>Petrognatha gigas</i> , F., v. <i>spinosa</i> , Kolbe.	Mvule
	<i>Inesida leprosa</i> , Fab.	Castilloa rubber
	<i>Dirphya</i> (<i>Nitocris</i>) <i>princeps</i> , Jord.	Coffee
Family	<i>Curculionidae</i>	
	<i>Rhyncophora phoeniceis</i> , Fab.	Palms
	<i>Cylas formicarius</i> , Fab.	Sweet Potatoes
	<i>Calandra oryzae</i> , Linn.	Stored Grain
Family	<i>Scolytidae</i>	
	<i>Stephanoderes coffeae</i> , Haged.	Coffee
	<i>Xyleborus confusus</i> , Erich.	Para rubber
	<i>Xyleborus affinis</i> , Erich.	"
	<i>Xyleborus camerinus</i> , Haged.	"

Species of Insects	Crops Attacked
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5 Order LEPIDOPTERA

Family	<i>Nymphalidae</i>	
	<i>Acraea terpsichore</i> , Linn	Sweet Potato
Family	<i>Papilionidae</i>	
	<i>Papilio demodocus</i> , Esp.	Citrus spp.
Family	<i>Noctuidae</i>	
	<i>Agrotis</i> , spp.	Coffee, cacao, cotton
	<i>Earias insulana</i> , Boisd.	Cotton
Family	<i>Limacodidae</i>	
	<i>Parasa</i> sp.	Coffee
Family	<i>Drepanidae</i>	
	<i>Metadrepna glauca</i> , Hmp.	Coffee
Family	<i>Pyalidae</i>	
	<i>Glyphodes ocellata</i> , Hmp.	Funtumia spp.
	<i>Plodia interpunctella</i> , Hb.	Stored grain

6 Order DIPTERA

Family	<i>Trypetidae</i>	
	<i>Dacus bipartitus</i> , Graham	Cucurbitaceae
	<i>Ceratitis punctata</i> , Wied.	Cacao
	<i>Ceratitis capitata</i> , Wied.	Coffee
	<i>Ceratitis anonae</i> , Graham.	Cacao

7 Order RHYNCHOTA

Family	<i>Pentatomidae</i>	
	<i>Nezara viridula</i> , Linn.	Cotton
	<i>Atelocera</i> sp.	"
Family	<i>Coreidae</i>	
	<i>Leptoglossus membranaceus</i> , Fab.	Cotton
	<i>Serinetha grisiventris</i> , Westw.	"
Family	<i>Lygaeidae</i>	
	<i>Oxycaraenus hyalipennis</i> , Costa.	Cotton
	<i>Oxycaraenus gossipinus</i> , Dist.	"
Family	<i>Pyrrhocoridae</i>	
	<i>Dysdercus nigrofasciata</i> , Stal.	Cotton
	<i>Dysdercus gossipinus</i> , Dist.	"

Species of Insects	Crops Attacked
Family <i>Psyllidae</i> <i>Trioza</i> sp.	<i>Citrus</i> spp.
Family <i>Aphidae</i> <i>Aphis citri</i> , Ashm. <i>Toxoptera theobromae</i> , Schout. <i>Aphis coffeae</i> , Neitn. <i>Aphis gossypii</i> , Glover.	<i>Citrus</i> sp. Cacao Coffee Cotton
Family <i>Aleurodidae</i> <i>Aleyrodes</i> sp.	Tobacco
Family <i>Coccidae</i> <i>Icerya</i> sp. <i>Dactylopius</i> (<i>Pseudococcus</i>) <i>citri</i> , Risso. <i>Pulvinaria jacksoni</i> , Newst. <i>Pulvinaria psidii</i> , Mask. <i>Ceroplastes ceriferus</i> , And. <i>Ceroplastes destructor</i> , Newst. <i>Ceroplastes galeatus</i> , Newst. <i>Ceroplastes quadrilineatus</i> , Newst. <i>Ceroplastes vinsonioides</i> , Newst. <i>Lecanium africanum</i> , Newst. <i>Lecanium viride</i> , Green. <i>Stictococcus dimorphus</i> , Newst. <i>Stictococcus gowdeyi</i> , Newst. <i>Chionaspis funtumiae</i> , Newst. <i>Aspidiotus</i> (<i>Selanaspides</i>) <i>articulatus</i> , Mor. <i>Aspidiotus gowdeyi</i> , Newst. <i>Aspidiotus transpurens</i> , Green. <i>Lepidosaphes beckii</i> , Neum.	Orange Coffee, <i>Citrus</i> spp. Cotton Coffee, tea, guava, etc. Coffee, tea, etc. Guava. Coffee "Nsambyia" Coffee " " Cacao, "Nsambyia" Coffee <i>Funtumia latifolia</i> Coffee Custard Apple Tea <i>Citrus</i> spp.

3. *Silkworms (Anaphe infracta, Walsm.)*—The amount of *Anaphe* silk exported during 1913-14 was about 12 tons, valued at £479. But, as the amounts, as given below, of nests purchased by the African Silk Corporation in the several districts show that that figure is not indicative of the growth of the industry or of the uncultivated nests available, for the reason that a large proportion of the purchased material consists of live nests, which are at present needed for "stocking", and, hence, will not figure amongst the exports for some time.

Mubende District—By the distribution of live nests for "stocking" the amount purchased per month is said to have risen from 500 lbs. to 4 tons. In this district some of the chiefs are said to have planted plots of *Bridelia micrantha*, the food plant of the caterpillar, which are now about six months old.

Toro District—In Western Toro the amount of nests purchased is said to have risen from 300 lbs. to 3000 lbs. in six months. In Eastern Toro 800 lbs. are reported to have been purchased in two months.

Bulemezi District—For the last four months 500 lbs. of nests per month are reported to been purchased.

Bugolobi Estate—At this estate the African Silk Corporation have 50 acres planted with *B. micrantha* and "stocked" with caterpillars. It is estimated that in the second year every plant should produce one nest and in the second year two crops of one nest each. About 20 average nests weigh 1lb., and 1000 nests produce 50lbs. of raw silk.

4. *The Collection of Insects and Other Biting Arthropods*—A large number of species of insects and other biting Arthropods, new to the collection, have been added to the collection, quite a few of which are new species. Several of the smaller families, however, are in need of attention, which for the lack of time has not been devoted to them.

5. *Donations of Arthropoda*—The following Arthropods were donated to the Imperial Bureau of Entomology :—

Euplexopera	375
Orthoptera	934
Isoptera	12
Mallophaga	14
Hymenoptera	1576
Coleoptera	2899
Lepidoptera	17
Diptera	58
Siphonaptera	20
Coccidae	27 spp.
Aleurodidae	2 spp.
Other Rhynchota	1987
Thysanoptera	242
Ixodidae	109
	8272

This is exclusive of small collections forwarded to the Bureau on behalf of certain collectors, mainly Medical and Veterinary Officers. In addition to the above, collections of certain families were donated to experts in those particular families in return for identifications.

6. *Fumigation of Plants and Seeds*—During the year the prohibition against the importation of coffee was removed, but after a short time the prohibition was replaced.

A table showing the imports is given below.

Countries of Origin

CONSIGNMENTS	United Kingdom	France	Holland	Italy	United States	West Indies	Australia	Gold Coast	South Africa	Mauritius	Zanzibar	British Central Africa	British East Africa	German East Africa	Somaland	Egypt	Abysinia	India	Federated Malay States	Total.
Cacao								1			3									1
Cloves											2									2
Cocoonuts													29							29
Coffee	1					2		1			1		2		1		1		3	12
Forest Seeds							2		4				4							10
Lucerne													2							2
Fruit, Miscellaneous	3			1		2			1	1		2	5			4		6		25
Ornamental, Miscellaneous	34												4							38
Tea														1			6			7
Tobacco													1							1
Vegetable Seeds	46	8	1		1								36					2		94
Wheat													1							1
TOTAL ...	84	8	1	1	1	4	2	2	5	1	6	2	84	1	1	4	1	14	3	225

7 Tours- Twenty-eight visits were made to estates occupying 113 days. The tours were mainly in the Singo, Chagwe, Buddu, Gomba, Lango and Kumi Districts.

I have the honour to be,

Sir,

Your obedient servant,

C. C. GOWDEY

Government Entomologist

REPORT BY THE BOTANIST

I assumed duty as an Officer of the Department of Agriculture at the beginning of March, 1913. My work during the past year has been almost entirely of a mycological nature, and the attention demanded by diseased material sent for examination has precluded my taking up other branches of botanical work, e.g. plant-breeding.

My arrival in Uganda coincided in time with the alarm caused by the spread of Coffee Leaf Disease (*Hemileia vastatrix*, B. and Br.) and attention was at once given to the disease. Preliminary investigations were directed towards the discovery of a local source or sources of *Hemileia* infection and towards finding the most suitable check to the progress of the disease. These two points were considered of primary importance. Experiments were conducted with various sprays and a powder. The former consisted of aqueous solutions of salt of various strengths and of salt and lime, also of different strengths, of Bordeaux and Burgundy mixtures, and of a mixture consisting of washing soda and resin, said to be used with success against *Hemileia* in Southern India. The powder consisted of a mixture of lime and sulphur. These trials were made as extensive as possible, and attention was given to nurseries as well as to older trees. The hygroscopic character of salt unfits it for use as a spray, and the addition of lime or lime-water to the salt solution did not increase its efficiency. The results got from the use of these salt and lime sprays were unsatisfactory enough to justify their abandonment. The best results have been obtained in my experiments and in the trials of estate managers by the use of Bordeaux or Burgundy mixture, and these preparations have been recommended to planters. Thorough spraying is, unfortunately, an expensive, and, in cases, an impossible measure, and its adoption as a prevention of or a check upon *Hemileia* disease has not been general.

The leaf disease occurring commonly on "native" coffee (*C. robusta*, Lind.) was examined, and a suspicion that it was due to the same species of *Hemileia* as that affecting "cultivated" coffee (*C. arabica*, L., var. ?) was confirmed by the authorities at Kew. Here, then, was a possible source of *Hemileia* disease, and tests in the form of infection experiments were carried out. In each case, the results were negative. These experiments will be continued on fuller lines, for the question as to whether the *Hemileia*'s of "native" and "cultivated" coffees are morphologically similar and biologically distinct is one of considerable economic and scientific importance. *Hemileia vastatrix*, however, has been in the country for some time as a parasite on the "cultivated" coffee of the pioneer plots established by missionaries and others.

Similarly, more attention than has been possible during the past year will now be given to the search for an *aecidium* stage in the life-history of *Hemileia*. The discovery of this condition, presumably on a different plant or plants belonging to the *Rubiaceae*, may modify our present attitude towards *Hemileia* disease, and may provide an additional means of combating the pest.

A Circular entitled "Coffee Leaf Disease", now in the printer's hands, and intended for local distribution, sets forth the present position and gives the basis of an attitude to be adopted towards *Hemileia*. This Circular supersedes the one published in August, 1913.

Other diseases of Coffee have not been numerous. Occasional examples of root disease due to *Hymenochaete noxia*, Berk., have been reported, but the damage done by this fungus has not been extensive. "Sooty Mould" is unsightly and has been found to follow in the wake of certain insects. The black crust is a species of *Capnodium* (*C. brasiliense*, Putt.) and yields to treatment by an appropriate insecticide.

On several estates, coffee trees have suffered severely by being planted in unsuitable soil, e.g. on denuded slopes, on rocky parts, and above a stiff clay sub-soil. These trees lose their vitality and wilt, and remedial measures can only take the form of replacing surface-soil and manuring.

Much harm has been done by a so-called "die-back" of Coffee. The tips of affected branches become blackened and the leaves fall. The trouble progresses towards the main stem and the bark of the branch cracks, and, in many cases, develops small open cankers after the death of the twig. The berries turn brown, but remain on the branch. Only one branch may be affected at first, and this branch may be on any part of the tree, though it is seldom found amongst the young apical shoots. Again some six or more branches at different levels may show signs of attack. Eventually the tree dies and presents a dried-up appearance, the wood being brittle. The root systems of trees killed in this way are generally poorly developed.

This trouble is most prevalent on trees which have suffered from *Hemileia* disease, or are placed in unsuitable soil, or are, from any cause, below what may be called a "normal condition". The cause of this "die-back" is not clear, and investigation of it is in progress. Field observations point to the fact that its presence or absence is governed by the above-mentioned conditions. It is not general enough in its occurrence to be entirely due to unsuitable soil-conditions, or to infection by, say, a wind-borne fungus, and it is never found on the healthiest trees. A reference to the Report on the Government Plantation, Kampala, will show that it yields to manurial treatment.

Examination of affected parts shows *Capnodium brasiliense* to be present on the exterior, especially in the neighbourhood of the nodes, and the small cankers show *Coniothecium* spore-forms of the same *Capnodium* in contact with the surface of the wood. Small unbroken pustules on the bark contain conidia of a form belonging to the *Melanconiaceae* (*Colletotrichum*, sp.) which may prove to be the same species as *C. coffeae*, Massee, described several years ago on coffee leaves from Uganda. It is probably in this form that the cause of the disease, if it is of fungoid origin, will be found. It may be remarked, however, that the mode of parasitism is unusual, and that the present impression is that, where every care is taken to rear only the strongest trees in the most approved way, there will the ravages of *Hemileia* disease be least, and there will the number of "die-back" branches be smallest. Again, the disease may be shown to be caused by a *Corticium*. The symptoms are similar in many respects to those of *Hevea* "pink disease" due to *C. salmonicolor*, B. and Br. No traces of *Necator decretus*, Massee, said to be responsible for a similar coffee disease in Malay, have been found.

PARA RUBBER (HEVEA) has been remarkably free from fungoid diseases. No leaf or pod diseases have been encountered, and the only root disease found was that known as Brown Root Disease, due to *Hymenochaete noxia*, Berk. Its occurrence was confined to one small area.

Several cases of what is provisionally labelled as "canker" have been examined. The affected trees had not been tapped; the disease was discovered by gummy exudations and bark discolouration. The diseased areas were well defined, the cortex being blackened and the surface of the wood of a uniform grey colour. Mycelium and conidia of *Phytophthora Faberi*, Maubl., were found in decayed tissue under the bark. The lack of material has prohibited further investigation.

As with cases of "canker", so with cases of "die-back". They have been few and they require further examination. "Die-back" has occurred only on young trees of two to three years of age, and, in all cases, the leading shoots had died to the whole of their unbranched portions. Upper lateral branches were affected only rarely. The brown discolouration described by Petch in Ceylon was conspicuous, and fructifications of *Gloeosporium alborubrum*, Petch, and of *Phyllosticta ramicola*, Petch, were found. No traces of *Thyridaria tarda*, Bancroft, were found until after the lapse of two months. The affected trees, which were relieved of dead wood, are now doing well.

Fasciation occurs rarely in Para rubber trees, but a fine example of it was obtained from a local estate.

CACAO in Uganda seems to be free at the present moment from root diseases. No "canker" has been found, and the cases of "die-back" have not been numerous. The species of fungi found on cacao stems were *Thyridaria tarda*, *Megalonectria pseudotrichia*, Speg., and *Nectria* spp., (*N. theobromae*, Massee, and *N. striatospora*, Zimm.?) and on pods, *Phytophthora Faberi*, *Thyridaria tarda*, and *Colletotrichum incarnatum* Zimm. The parasitic amongst these fungi have been responsible for "die-back" and pod affections. In one case involving two pods, these were found to be split longitudinally along a ridge, the gaping wound so produced being surrounded by a blackened area. The contents of the pod in the neighbourhood of this blackened area were affected, but no fungi except saprophytic moulds were found on them. *Diplodia* spores of *T. tarda* were present on the pod, but it is unlikely that this fungus was responsible for the damage done. Examples of hardening and rotting of cacao pods have been so few as to prevent dogmatism with regard to the causes of the diseases.

The formation of a herbarium is in progress. Most attention has been given up to now to flowering plants and fungi. It is hoped to have, in time, a fairly representative reference collection.

During 1913-14 many additions have been made to the Library of the Department, but the books and pamphlets, circulars and bulletins of other Agricultural Departments, Experiment Stations, and similar institutions, are still too few in number for reference purposes, particularly in connection with mycological work.

Visits have been paid to a large number of estates and to districts where field examination or prompt treatment of plant diseases was necessary.

As Secretary, I have been in charge of the business of the Buganda Plant Pests Board.

During the year under review, two Circulars dealing with Coffee Leaf Disease have been published, and a short paper giving an account of the present position of *Hemileia* in Uganda has been sent to the 3rd International Congress of Tropical Agriculture meeting in London in June, 1914.

W. SMALL

Government Botanist

APPENDIX 1.

ESTIMATED NUMBER OF LIVE STOCK IN THE PROTECTORATE.

Province	District	Horses	Mules	Donkeys	Horned Cattle	Sheep	Goats
Buganda	Mengo	1	30	15	56,000	7,000	120,000
	Entebbe	-	-	10	800	-	3,000
	Masaka	-	3	10	65,857	15,254	53,722
	Mubendi	-	9	6	7,161	5,103	30,040
Eastern	Busoga	-	4	10	44,000	14,000	38,500
	Bukedi	1	12	150	58,000	46,000	125,000
	Teso	-	1	9	120,000	50,000	85,000
	Lango	-	3	2	43,250	80,000	220,000
	Karamoja Lobor	No basis for estimate					
Northern	Busindi	-	2	3	5,597	2,235	17,987
	Hoima	-	1	3	4,560	1,494	8,476
	Gulu	-	3	10	?	?	?
	Chua	-	-	-	-	-	-
Western	Toro	-	2	3	43,000	46,000	78,500
	Ankole	-	6	4	330,000	275,000	440,000
	Kigezi	-	-	?	?	?	?
Rudolf	Turkwel Turkana Dabossa	No basis for estimate but number very large ; stated to be in the neighbourhood of half a million head of cattle and three million sheep and goats.					

APPENDIX 2.

NATIVE AGRICULTURE

Province	District	Cotton	Ground-nuts	Sim-Sim	Plantains	Sweet Potatoes	Coffee	Rubber	Miscellaneous	Total number of acres in crop	Total area of District
Buganda	Mengo	20,000	1,815	5,387	400,000	199,177	?	3,378	14,770	620,000	6,194,560
	Entebbe										535,040
	Masaka	2,000	600	150	120,000	12,000	2,650	60	2,000	141,874	2,374,400
	Mubendi	3,500	385	610	48,932	34,823	160	64	100	99,224	1,536,000
Eastern	Busoga	25,000	2,000	2,500	215,000	25,000	-	-	Chillies 10,000	410,000	2,190,080
	Bukedi	20,104	?	?	?	?	7	7	{ Rice 25 Linseed 10	167,870	2,245,120
	Teso	33,738	?	?	?	?	?	?	?	260,000	2,450,000
	Lango	4,872	?	?	?	?	-	-	?	339,000	3,254,400
	Karamoja	Nil	?	?	?	?	?	?	?	?	?
	Lobor	Nil	?	?	?	?	?	?	?	?	?
Northern	Bunyoro	700	?	1,321	4,000	2,454	10	10	?	143,500	2,989,440
	Gulu	100	?	-	-	?	-	-	-	?	3,182,080
	Chua	Nil	?	?	?	?	?	?	?	?	4,977,120
	Toro	150	1,000	1,000	10,000	8,000	20	2	{ Millets 40,000 Indian corn 500 Peas 3,000 Cassava, 400	72,160	3,477,040
Western	Ankole	100	?	?	?	?	?	?	?	83,200	4,158,200
	Kigezi	Nil	?	?	2,500	5,500	?	?	{ Peas 79,000 Millets 40,000 Beans 20,000	156,000	1,248,000
Rudolph	{ Turkwel Turkana Dabosa								ESTIMATE		898,560 4,379,080 4,877,280

APPENDIX 3

EUROPEAN CULTIVATION.

The Returns of Plantations are incomplete. It is estimated that something over 20,000 acres are cultivated. The following Table gives the totals for 86 Plantations, from which Returns were received.

Province	Total area under Cultivation	Acreage of Coffee only		Acreage of Coffee & Para		Acreage of Para		Acreage of Cacao & Para		Acreage of Cacao	
		under 2 yrs	over 2 yrs	under 2 yrs	over 2 yrs	under 5 yrs	over 5 yrs	under 4 yrs	over 4 yrs	under 5 yrs	over 5 yrs
Buganda	15,000	3,000	3,500	446	1,030	77	2,155	70	50	600	111
Eastern	2,930	1,895	332	5	5	200	-	-	-	-	$\frac{1}{3}$
Northern	50	-	-	-	-	-	-	-	-	-	-

EUROPEAN CULTIVATION (Cont)

Province	Acreage of Ceara	Acreage ready for Cacao	Acreage of Robusta Coffee and Para over 3 years	Acreage of Tea	Acreage of Cotton	Acreage of Sugar Cane
Buganda	1,000	900	100	10	50	50
Eastern	65	100	-	-	50	-
Northern	-	-	-	-	-	-

APPENDIX 4

COTTON GINNERIES

There were on the 31st of March, 1914, twenty Power Ginneries built and building in the Protectorate. Of these only ten were working on that date, but several more were nearing completion.

The following Table shows the machinery which should be in readiness to deal with the coming season's crop :—

Particulars of Machinery	Total
Power Roller Gins	180
„ Saw „	29
„ Baling Presses	18
Seed Openers	16
Delinters	3
Number of Factories	20
<i>Kind of Power :—</i>	
Steam	3
Oil	9
Suction Gas	8
Hand Ginneries	
Hand Roller Gins	52
„ Saw „	18

APPENDIX 5

REPORT BY THE IMPERIAL INSTITUTE ON A SAMPLE OF TEA
PREPARED AT THE GOVERNMENT PLANTATION, KAMPALA.

DESCRIPTION OF SAMPLE

The sample weighed $10\frac{1}{2}$ ozs., and consisted of rolled black tea, dry and in good condition, but of somewhat uneven colour, a small quantity of light leaf being present.

RESULTS OF EXAMINATION

The tea was chemically examined with the following results :—

	Expressed on material as received per cent	Expressed on material dried at 100° C. per cent
Moisture	8.05	—
Caffeine	3.67	4.0
o Tannin	9.5	10.3
Ash	4.76	5.2
x Extract	36.0	39.1

o Determined by Procter's modification of Lowenthal's process.

x The percentage dissolved by a given quantity of tea with one hundred times its weight of boiling water and allowing it to infuse for 10 minutes.

The following are the corresponding results obtained at the Imperial Institute for Indian and China teas :—

	Material as received		Material dried at 100° C.		
	Moisture per cent	Caffeine per cent	Tannin per cent	Ash per cent	Extract per cent
Indian teas (13 samples) :—					
Maximum	7.8	4.1	11.1	6.9	35.2
Minimum	6.4	3.6	6.9	5.4	27.4
Average	7.1	3.8	9.2	6.0	31.7
China teas (8 samples) :—					
Maximum	9.2	3.7	9.3	8.2	27.2
Minimum	7.1	2.6	3.3	6.0	19.0
Average	8.2	3.0	5.2	6.8	24.3

From a comparison with these figures, it will be seen that the present sample of Uganda tea is rich in caffeine, tannin and extractive matter, and in this respect it resembles Indian rather than China tea.

COMMERCIAL VALUATION

The sample was submitted to a firm of brokers, who reported that it represented a blackish, rather bold and mixed, unassorted tea, with some white tip. The liquor was of fair strength, with some quality, but was very light in colour; and the infused tea, whilst generally of good colour, was uneven, with some greenish leaves. The brokers stated that the value of the tea was uncertain, but might be nominally about 8½d to 9d per lb in London (January, 1914).

The brokers mentioned that this tea was very similar in style and appearance to a variety which used to be received from Java some years ago, called "Flowery Pekoe," but they added that the present sample had evidently not been graded. Compared with that of Indian, Ceylon and Java teas, the liquor was in their opinion too thin to attract the competition of most buyers in London. They considered that the tea might with advantage be given a longer fermentation and also a heavier rolling, which would tend to increase the colour and strength of the liquor.

The firm added that the sample showed very fair manufacture, and if the suggestions made above were acted upon they were of opinion that quite a satisfactory price would be realised in London, provided the tea came forward in marketable quantities of say not less than 20 chests at a time, each weighing 90 to 100 lbs. net, or twice the number of half-chests averaging 50 lbs net.

January 23rd, 1914.

COMPARATIVE STATEMENT OF EXPORTS CONNECTED WITH AGRICULTURE

Articles	Unit	Year ended 31-3-10		Year ended 31-3-11		Year ended 31-3-12		Year ended 31-3-13		Year ended 31-3-14	
		Quantity	£	Quantity	£	Quantity	£	Quantity	£	Quantity	£
Coffee	cwts	229	371	270	383	1,712	2,563	3,336	8,940	12,252	23,167
Chillies	"	9,638	7,417	17,462	20,492	13,643	16,658	10,599	12,408	7,205	8,247
Groundnuts	"	3,075	1,160	7,056	3,180	9,155	4,279	11,780	5,570	7,671	3,740
Ghee (clarified butter)	"	2,862	6,379	3,029	6,109	2,911	5,819	4,737	11,439	4,851	12,507
Jaggree (unrefined sugar)	"	257	200	330	263	289	226	319	301	216	193
Simsim seed	"	14,159	5,431	10,589	4,477	13,855	7,048	31,402	16,812	17,919	10,449
Cotton ginned	"	13,197	37,416	32,694	120,664	59,277	184,639	77,728	214,170	85,217	272,366
" unginned	"	29,922	22,180	50,281	44,748	45,664	46,211	48,538	40,209	44,130	45,321
Cotton seed	"	8,575	849	32,078	3,208	58,549	5,909	112,283	11,335	134,128	13,499
Beeswax	lbs	4,043	154	3,950	162	3,539	162	2,352	117	882	42
Hides	cwts	7,879	17,974	7,551	20,544	9,032	26,191	12,878	45,854	13,837	52,926
Rubber	"	945	14,121	898	13,412	277	4,117	243	3,647	93	1,107
" plantation	lbs	...	...	552	147	2,102	325	4,474	834	19,454	2,984
Skins (goats)	no.	727,294	27,482	664,430	24,920	581,615	22,249	573,852	28,543	464,987	29,037
" (sheep)	"	95,885	1,748	95,160	1,771	77,964	1,559	83,989	1,940	59,644	1,615
" (calf)	cwts	252	574	460	1,277	225	705	847	2,941	1,052	4,204
Miscellaneous	no.	2,280	146	...	1,278	...	4,979	...	7,994	...	...
Cotton seed cake	cwts	2,224	223	...	...	...	...	...	...	...	...
" oil	galls	4,155	330	13,088	1,322	3,213	3,776	583	716	...	...
Simsim oil	"	2,078	226	3,263	355	...	...	7	12	...	...
Horses	no.	...	...	...	...	...	...	...	...	...	...
Mules	"	12	410	...	66	8	75	...	...	...	...
Donkeys	"	292	283	103	126	450	207	...	...	...	...
Cattle	"	...	...	...	...	382	601	2	4	...	...
Miscellaneous live stock	"	699	429	889	556	710	1,144	1,516	6,205	246	1,006
Miscellaneous	"	...	...	...	1,584	...	474	632	428	...	...
							1,954	...	3,333	...	3,792
GRAND TOTAL			£145,430		£271,044		£341,870		£423,752		£486,223

